The Builder.

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Books for Architectural Students.

THE Royal Institute of Architects have issued, as most of our readers are aware, a list of books which students are advised to study in order to fit themselves to pass successfully the examination which is now the necessary preliminary to election to the Associateship of the Institute. As the list of books is a long and varied one, it may be of use if we take a rapid general survey of the nature of their contents, and indicate what is the special kind of information to be looked for from them severally; or from the principal ones, at all events.

The first division on the Institute list is headed "General History and Biography," and among the first books named are Mr. Fergusson's works,—that known in its earlier form as "Illustrated Hand-book of Architecture," and in its later form as "History of Architecture in all Countries" (both are named in the list), to which is added the same writer's "History of the Modern Styles of Architecture," that is, from the Renaissance to the present day. These are books which stand more decidedly alone in modern architectural literature than some people are aware of. The illustrations in them, it is true, though most carefully selected and admirably engraved, are on too small a scale, and in the majority of cases too pictorial rather than architectural, for the purposes of serious study of the architectonic character and details of a building. They were necessarily so, in order to prevent so comprehensive a book from swelling to a size and costliness which would have put it practically out of the reach of the majority of the readers for whom it was intended. But it is in its comprehensiveness, and the logical and carefully-considered plan on which it is carried out, that its great value lies. In this respect we know of no other work on architecture to which it can be compared. Here alone the student can take, in one book, a survey of the whole history of the known architectural styles of the world, with sufficient illustration to bring the salient features and peculiarities of each before him, and their historic and artistic relations with each other; and accompanied by a great body of thoughtful criticism and analysis, which, if we do not agree with all the conclusions arrived at, has at all events the advantage of setting the student thinking on the meaning and purpose of architecture, and the influences under which its various types have been developed. It may be added that in the illustrations the student gets a good deal of what is to be found otherwise scattered through various works. A great many of them are collected from illustrations in various other works mentioned in the same list we are considering (their sources being always acknowledged); and though this will not stand instead of ultimate reference to these separate works, the student gets a first view here of what he would otherwise have to wait for till he had hunted up a number of separate publications. Let the beginner, then, who wishes to get a rational and comprehensive view of the great subject he is entering upon, study his "Fergusson" assiduously, and make notes from it, if he cannot possess himself of a copy (if he can he will find it always useful); he cannot make a better beginning.

There is another book in this first section of the Institute list which also stands alone in its way for comprehensiveness and excellence, and that is Gailhabaud's "Monumens Anciens et Modernes." The text is a minor matter in this case, the value of the book is in its illustrations. It is one of those costly and beautifully-got-up books of architectural illustration of which there are far more examples among French than among English publications The illustrations are not all equally attractive in manner; for instance, those of Mediæval buildings will seem hard and tame in style to English eyes, accustomed to a different method of rendering this class of architecture. But the book contains a body of illustrations of architecture of all ages, on a scale and with a general beauty of execution not to be found in any other single book we know of, from such ancient remains as Mycenæ and Tiryns (so much of them as was known, that is to say, in the præ-Schliemannite period) down to the late Gothic period. Mr. Fergusson has drawn considerably on Gailhabaud for his own illustrations; and it is a good book to take in conjunction with the "Handbook of Architecture," for a general view of the subject.

Ramée's "Histoire Générale de l'Architecture" is a comprehensive philosophical treatise, very suggestive for its thoughtful and broad view of the subject, commencing with tracing the roots of architecture, as it were, in the history and migrations of the human race. It is not largely illustrated, but the illustrations are very much to the point and carefully executed. They deal rather with the logic than the picturesque of architecture. Gothic is viewed from a very French standpoint, but the development of vaulting is very clearly demonstrated and illustrated by diagrams.

Kugler's "Geschichte der Baukunst" ("History of Architecture") is a rather bald and uninteresting summary of the subject, with hard and ineffective illustrations; and, considering that few English students read German, its value in the list is very problematical. There are two other books that, in our opinion, should have been in the suggestive list for general treatment of the subject of architecture:—Lesueur's "Histoire et Théorie de l'Architecture," which is a very suggestive book with many brilliant points in it, by one of the most eminent and accomplished French architects of the last generation; and Mr. Garbett's little treatise on Architecture, in Weale's series, which, with some eccentricities of view, contains more real thought on the meaning of architecture than any other book of the same size.

Batissier's "Histoire de l'Art Monumental" is not a book for students so much as for general readers; it is a philosophic treatise on architecture, giving a broad sketch of the history of the art, but with little illustration. The same may be said of Mr. Freeman's work; it is a suggestive history for general readers rather than an architectural student's book. De Quincy's "Dictionnaire Historique d'Architecture" contains a great deal of heterogeneous information, given in a dry style, and without illustrations: a useful book for looking up out-of-the-way information. His "Histoire de la Vie et des Ouvrages des plus célèbres Architectes" is what is called a "readable" book, containing pleasantly-written lives of Brunelleschi, Alberti, Bramante, San Gallo, Sansovino, Palladio, De Lorme, Scamozzi, Perrault, Mercier, Soufflot, Wren, Inigo Jones, and others. Milizia's "Lives of Celebrated Architects" (English translation) is a commonplace book, but gives general facts. There are hardly any good lives of architects. Vasari's "Lives of eminent Painters, Sculptors, and Architects," is one of the most delightful books ever written, but more pleasant than trustworthy, and architects do not occupy a very large proportion of it. The description of the building of the Florence cupola, in the Life of Brunelleschi, and the incidents connected with it, is as interesting as a novel; but Vasari's knowledge of architecture was very skin-deep, and he was a great partisan, and "wrote up" his own friends as conscientiously as any modern reviewer.

Under the head of "Classical," the first books to look at are those which give comprehensive and accurate illustrations of the various types of Classic architecture. The name of Vitruvius, of course, stands at the head of the list of Classic architectural literature,—a name always to be honoured as that of a high-minded man as well as a studious architect; but the young student who takes up his book in the expectation of getting much information from it on Classic architecture will probably be a good deal disappointed. The

real value of Vitruvius consists in the light which he throws on the manner in which architecture was regarded and practised in his day, and on the habits of building and living among his contemporaries; and even this is obscured a good deal by the difficulty, in the absence of any illustrations, of understanding the precise meaning of his terse and condensed descriptions. Of the books which give accurate illustrations of the details of Greek and Roman architecture, Normand's "Parallel of the Orders of Architecture," translated and re-edited by Pugin, is one of the most useful. This gives pure Greek work as well as the "orders" as practised by the Romans and imitated by the Renaissance architects, who do not appear to have known anything of pure Greek work. It is a work in plain outline drawing, giving the facts of detail, not the picturesque appearance, of the various types. Mauch's "Neue Systematische Darstellung der Architektonischen Ordnungen" ("New systematic Representation of the Architectural Orders") is much the same thing, only that the illustrations are not so finely drawn or engraved. Stuart and Revett's great work on Athens, and Taylor and Cresy's on Rome, were admirable for the time in which they were produced, and for giving a comprehensive view of the antiquities of the two great seats of ancient Classic architecture; but photography has supplanted their "views," and increased facilities of travel also have made us in this generation much less dependent on works of this kind. They are fine books to turn over, but the student will learn more about the way the leading types of Classic architecture are designed and put together from the comparatively dry-looking geometrical drawings in Normand's "Parallel." For beautiful illustrations of ancient remains the volumes of the Society of Dilettanti, "Antiquities of Ionia" and "Unedited Antiquities of Attica," are well worth looking at, as well as for special information on special remains.

In Vignola's "Architecture" and Palladio's "Architecture" the student may see how Classic architecture was regarded by two distinguished architects of the Renaissance in Italy. Palladio is a great name, but his value to the modern student is but small. He represents the time when people were eaten up with the worship of everything Roman, and treats promiscuously "of their marriages," "of their divorces," "of their funeral rites," "of towers and steeples" (these are the titles of four consecutive chapters), and gives designs for applying their orders to modern buildings, with general expressions of contempt for all buildings constructed on other principles. Palladio has notions, however, which are worth attention, *e.g.*:—

"But of all abuses, in my opinion, the most intolerable is the making certain frontons * of doors and windows or galleries, divided in the middle; because these frontons were contrived at first to defend those parts from rain, necessity having once taught our first architects to give to them the form of a roof; so that I know nothing more contrary to natural reason than to divide and open that part, which the ancients did make whole in order to defend the inhabitants of the house, and those that enter into the same, from rain, snow, hail, and other injuries of the air; and although variety and novelty should please all, yet we are not to go against the principles of art, and that which reason demonstrates."

So there is a little advice from Palladio for the gentlemen who rejoice in broken pediments.

Vignola's work, of which there is a good Paris edition of the date of 1815, gives orthodox examples for doorways, with pediments, cornices, architraves, and brackets, and a number of ornaments, candlesticks, &c., of a flimsy Renaissance pattern. The main value of the book consists in the full illustrations of his remarkable building, the Villa Caprarola, and of some other villas of fine, though less original type, including some rich, but formal, designs of ceilings. Canina's voluminous book, "L'Architettura Antica," in nine folios, has had its day, and is likely to mislead the student in regard to the "restorations" of some of the antique temples, &c., which are entirely overthrown by the fuller archæological knowledge of the present day. It contains a number of geometrical elevations in a hard, precise, mechanical style, but most things illustrated in it are to be found better illustrated elsewhere. The perspective views are singularly weak and poor; in fact, the work has acquired a reputation (perhaps from its size) quite beyond its merits.

* *I.e.*, pediments.

From general works on Classic architecture we come to the class of works called Monographs, dealing with one particular building. Of these, Mr. Penrose's "Principles of Athenian Architecture," which is mainly an investigation of the corrections for optical illusions in the Parthenon, and of the practical construction of that unique building, is, for absolute thoroughness of execution, as well as the importance of the discoveries detailed in it, one of the most remarkable books in all architectural literature, and sheds a new light on the architectural methods of the Greeks. It is one of the most important books to master on Greek architecture, after the several treatises before alluded to, and is a fine example, too, of method and precision in architectural measurement and investigation. Inwood's "Erechtheion" is also a learned and carefully got-up book, with very fine and careful line drawings, and a beautiful restored view of the temple; but it has none of the special value of Mr. Penrose's work. Cockerell's "Ægina and Bassæ" gives to students fine illustrations of another chapter in Greek architecture.

Nicholson's "Principles of Architecture" is a practical and geometrical work, commencing with geometrical problems and following with their application to measurement and design; it has not much special bearing on the study of Classic architecture in particular. Wood's "Palmyra" and "Baalbec" are large old-fashioned works, with rather coarsely-executed and very probably inaccurate engravings. We do not recommend the student to trouble himself with them. Wilkins's "Magna-Grecia" gives illustrations of the Early Doric of Italy and Sicily, but Hittorf's book on the temple at Selinonte (not in the list) is a better one.

The book at the head of the Institute list of Byzantine studies, Couchaud's "Églises Byzantines en Grèce," little known, is an important one, as it gives Byzantine church architecture in some of its simplest and most primitive forms, illustrating buildings which, in works on Greece, have been overlooked beside the glory of the Classic remains. Hübsch's "Monuments de l'Architecture Chrétienne" is a splendidly-illustrated work, showing admirably, in the first instance, the transition from trabeated to arcuated construction in a series of examples, and giving numerous illustrations of San Vitale, Ravenna (with a great many fine chromo-lithographs of the coloured decorations), the church of Parenzo, &c. The book deals only with the Byzantine type of church, and concludes with some examples of modern work in this style. Salzenburg's book on the Byzantine buildings of Constantinople is in reality mainly a very fine monograph of the great Byzantine church of St. Sophia. In Texier and Pullan's work the student will follow the same class of architecture in its examples in Asia Minor, and in Verneilh's work he will find the best illustrations of the very interesting churches on the Byzantine model which are found in the south of France. These books, studied in the order in which they occur in the Institute list, will give a very complete view of Byzantine architecture, than which no chapter in the history of architecture has been more finely, though some have been more profusely, illustrated in architectural publications.

The list of books on Mediæval architecture is headed by Bloxam's treatise on the "Principles of Gothic Ecclesiastical Architecture," (eleventh edition), and it is no small credit to the author of this little book, written at almost the commencement of the Gothic revival, that it still remains, perhaps, the best and most attractive work from which the young student may obtain his first ideas on Gothic architecture. The illustrations are well selected and admirably engraved, and the writing interesting and pervaded by a contagious spirit of enthusiasm. Rickman's "Attempt to Discriminate the Styles of Architecture in England" should be read: much has been discovered since about Gothic architecture, but Rickman's still remains an admirable analysis of the English styles, for which he invented the nomenclature which has since been generally accepted. From these the student should pass to Scott's "Lectures," a book full of information and illustration, the more valuable as coming from one who had such exceptional opportunities of putting his knowledge into actual practice, and did so with such splendid success. Brandon's "Analysis of Gothic Architecture" is in reality a series of admirably-selected and carefully-drawn examples, and a most useful book for study. Dollman and Jobbins's "Domestic Architecture" is a book of the same type, but with still better illustrations, and an abundance of carefully-drawn detail; a most useful book for the student. Gailhabaud's "Architecture du Vme au XVIIme Siècle," compiled from drawings and measurements by French and foreign architects before unpublished (date 1858), contains an immense number of finely-executed illustrations of various buildings and of Mediæval detail, but from the way in which it was got up it is rather heterogeneous, and not of so much value to students, who wish to get at the central and typical examples of the style. Caumont's "L'Architecture Religieuse" is a small work, profusely but not very finely illustrated, chiefly useful as classifying a great deal of the French Mediæval ornament, and giving suggestions as to the origin and meaning of typical ecclesiastical ornaments and symbols. "Architecture, Civile et Domestique," by Verdier and Cattois, is a beautifully-illustrated book, giving a great many French and Belgian Hôtels de Ville and smaller buildings, with numerous plans to a small scale, and a great deal of information arranged in a very systematic and lucid manner. King's "Study-book of Mediæval Architecture and Art" is a work dealing mainly with Belgian and German Gothic. The author practised at Bruges (1858 is the date of the book), and claims these special merits, that the examples are very numerous, they are drawn and measured under his own eye, and are all to the same scale. The illustrations are not very refined in execution, but they give a number of examples of Gothic work not of the finest order, but with a special interest as illustrating a certain school of Mediæval architecture. Pugin's architectural illustrations of Normandy it is only necessary to name. In the list are two splendid works which, to our surprise, we have found are less known to Gothic students of this generation than they ought to be: Bowman and Crowther's "Churches of the Middle Ages" and Sharpe's "Architectural Parallels." The first is a series of beautiful measured drawings of some of the finest churches of England, every detail, ornament, and moulding being religiously drawn from measurement, and a finely-executed perspective view of each church added. Sharpe's book is a series of illustrations, executed with the same thoroughness, and with even greater beauty, of the principal Cistercian abbeys of Yorkshire (mainly), giving careful perspective drawings of their actual state, restored elevations, and all existing details. This is one of the most sumptuous architectural publications in existence. Last, but not least, comes that wonderful monument of labour and genius, Viollet-le-Duc's great "Dictionnaire," in which not only the forms but the very spirit of French Mediæval architecture are brought before us in every detail. No English translation of this work has appeared, and as the number of people who read French as a matter of course becomes every year greater, there is less and less chance that such an undertaking would pay; so those students who have not got up their French must do so, if they wish to get all the advantage of Viollet-le-Duc's wonderful book.

Under the head of "Renaissance," the two largest works named in the list are Letarouilly, "Édifices de Rome Moderne," and Cicognara, "Le Fabbriche e i Monumenti di Venezia." Like Canina's, these are works which have gained a conventional reputation somewhat

beyond their merits. Cicognara gives a number of plans of the Venetian palaces, and his large-scale drawings of mantel-piecss, &c., with sculpture accessories (very well drawn) are valuable. But the drawings of the buildings are hard, prosaic, and uninviting, and seem to rob them of half their poetry and expression. Letarouilly gives numerous elevations and plans of Renaissance villas, very full drawings of the Farnese Palace, of San Lorenzo, and other celebrated buildings, all in a hard, precise, and careful outline, the perspective views being treated in the same way. It is not a fascinating work, but it is a useful one for the study of very carefully-drawn detail. Berty's "Renaissance Monumentale en France" is a most beautifully-illustrated work on French châteaux, giving many of the finest examples. Sauvageot's "Palais, Châteaux, Hotels, et Maisons" is of the same class, but even more finely illustrated,—in fact, unsurpassable in this respect; it is accompanied by short and condensed descriptions of each building, with plans. Percier and Fontaine's "Palais, Maisons, &c., à Rome," is like another but not so good a Letarouilly, equally hard and unprepossessing in the style of its illustrations, and not so finished in execution.

Under the modest head of "Encyclopædias, Glossaries, &c.," comes one of the most remarkable of English architectural publications, Gwilt's "Encyclopædia of Architecture," Mr. Papworth's revised and enlarged edition. Gwilt is the English Vitruvius, and though the illustrations to the work are small and old-fashioned, the extent, variety, and accuracy of the information contained in it are most remarkable, especially in regard to the practical and scientific side of architecture. There is hardly any subject connected with this side of architecture on which Gwilt has not valuable information to give; and it is a book every architectural student should possess; he will constantly find its value. Parker's "Glossary of the Terms used in Architecture" is a well-known and useful book; and the "Dictionary of Architecture" will be an admirable one, if it is ever finished. It has got as far as Q, however, which at one time its best friends never expected.

Under the heading of "Mouldings and Ornaments" we have Chambers's treatise on "The Decorative part of Civil Architecture," a book of rather mixed value. The modern small edition (1821) is the best, both as more handy and because the illustrations are much better engraved, and Gwilt's introductory essay on Greek architecture is interesting. Chambers obviously regarded his book as a kind of modern Vitruvius, and he gives minute directions for the use and proportioning of the orders, based on Vitruvius. His sketches of the development of stone architecture out of wood are exceedingly imaginative, or imaginary, and are quite out of date in the light of more recent knowledge. Vulliamy's "Examples of Ornamental Sculpture in Architecture" is the only really good book of Classic ornament in this part of the list; it contains beautiful illustrations, to a large scale, not only of Roman and Renaissance, but of pure Greek ornament, which all the others almost ignore. Tatham's "Etchings" consist of a number of etchings of mostly very vulgar Renaissance ornament, the best things being a series of antique tazzas and bowls. The book is not of much value, artistically. Albertolli's "Decorazioni di Nobili Sale" is chiefly notable for beautifully-executed wood-engravings of Renaissance foliage ornament, many of them fine examples. There are a variety of ceiling and other designs, in a very mannered taste, but suggestive. His "Corso Elementare di Ornamenti" is a book of studies for drawing Classic foliage, progressing from the simple leaf to more ornate and difficult examples; old-fashioned, but containing fine studies for free-hand drawing. "Architectural Ornaments," by Heideloff and Görgel (English text), contains much bad German ornament, very well drawn; it may be studied as a warning. Mr. Colling's "Gothic Ornaments" contains much good Gothic ornament equally well drawn, and is a book to be recommended to the student. Paley's "Manual of Gothic Mouldings" is another of the small books, like Bloxam's, produced in the earlier stage of the Gothic revival, which still keep their place; but Sharpe's "Mouldings of the Six Periods of Gothic Architecture" is much better, because more complete and systematic, and drawn to a large scale; it is the real book for the study of the subject. Altogether, the Gothic side of "mouldings and ornaments" is much better represented in the Institute list than the Classic side of the same subject.

In another article we will say something about the books recommended in connexion with Sanitary and Constructive subjects.

HYDRAULIC WORKS OF ENGLAND, CANADA, EGYPT, AND INDIA.*

THE volume just issued by Messrs. Thacker is described by its author as a compilation of statistical information relating to hydraulic works which have been carried out in England, Canada, Egypt, and India, combining therewith certain particulars of the hydrology of those countries. Mr. D'Aguilar Jackson has published several treatises of a similar character, and his present work, he states, is to a certain extent an enlargement of Part II. of a previous publication, entitled "A Hydraulic Manual and Statistics." There is but little original matter in the book, the intention of the author being apparently to bring together in a compact and easily accessible form a mass of information which is for the most part at present either buried in official archives, or not readily attainable, even to professional men.

Objection may perhaps be taken to Mr. Jackson's assertion that in Great Britain hydraulic works have lately been confined to schemes of improved water supply and of sewage irrigation, but from subsequent remarks his intention is evidently to confine the term to works of navigation and storage; for no allusion is made to docks, harbours, drainage, river bridges, dredging, or estuary improvements, all of which come essentially within the category of hydraulic works. Though apparently compiled primarily for the benefit of the engineers of the Indian Public Works Department, the book contains much information which is not generally known in England, even amongst engineers, especially as regards the gigantic scale on which hydraulic works have been carried out in foreign countries. The statistics relating to the rivers of Great Britain, which have been compiled from various well-known writers, are conveniently arranged in divisions, showing the number of basins in each group, with the area, population, and geological formation, so that all such particulars with regard to any individual watershed are readily seen. Following this statement is a table of the various canals and navigations, compiled mainly from the statistics laid before the Parliamentary Committee in 1883. The particular feature in this table is the fact that out of the twenty-two "through" navigation routes, only four have not some link in their course not taken over by the railways, viz., two of the routes between London and the Severn, and two of those between Liverpool and Hull; or, according to the Board of Trade returns, out of 2,437 miles, 1,636 miles are under the control of the railway companies, by which means the traffic of the country is heavily weighted, and deprived of the cheap carriage which water transit alone can secure. Mr. Jackson thus pithily contrasts the actual results that might have been effected by that Committee with the absolute total absence of results, "the treatment being parallel to that in the case of the water companies and many other cases of oppression under unjust free contract,—that is, in favour of the plutocrats and to the detriment of the public."

The statement of the principal storage works in Great Britain in 1881 is arranged so as to show at a glance information which has not hitherto been so conveniently afforded, and is interesting in enabling one to arrive at the general cost of storing 1,000,000 cubic feet of water in large reservoirs. The two largest recorded, those supplying the towns of Liverpool and Manchester, and having a capacity of 649,000,000 and 727,000,000 cubic feet respectively, cost at the rate of 3,650*l.* and 3,950*l.* per million; but though not so stated, those sums probably include a portion of, if not all, the expenses of distribution, and also presumably the capacity is calculated upon only a single filling; for, as the reservoirs are said to contain a supply sufficient only for 220 and 142 days respectively, they must, in order to be effective, be replenished from time to time, and therefore the actual cost of storage per million cubic feet is probably much less than the above figures seem to indicate. Taking, however, the statement as it stands, out of fourteen large reservoirs, in nine the cost averaged 3,650*l.*; in three, 1,316*l.*; and in two, 650*l.* per million cubic feet. Similar works in Southern India, for the supply of the cities of Madras and Nagpore, apparently have cost at the rate of only 40*l.* and 135*l.* respectively per million cubic feet; while the Vehar Lake, for the supply of Bombay, on a much more costly scale, amounted, inclusive of distribution, to 1,200*l.* per million cubic feet.

The chapters on Sewage Irrigation consist, for the most part, of a series of statements, in which are tabulated several particulars of information derived principally from Parliamentary returns issued some ten years ago, together with an abstract from the judge's report on the sewage farm competition, issued in 1879. Though there may be more or less value in the particulars afforded, yet as the subject has been, and is receiving greater consideration, and more light is daily being thrown on sewage operations, the experience and results arrived at ten years ago have perhaps more value in showing what has to be avoided, rather than what has to be followed. The operations conducted at the various places where there are sewage farms are clearly described, while the details as to the number of waterings and weight of the various crops are valuable as records of actual results. Amongst others, the outturn obtained at Reading, in the case of mangolds, is especially noteworthy,—"The crop of long red mangolds, in 1874, having been marvellous," it is said, "their yield per acre being 118 tons with tops, and 98 tons without them." The conclusion arrived at by Mr. Jackson himself, as regards sewage disposal, is that "farming with effluent and suitable sewage remains the only sure and economic method."

Passing on to Canada, the author describes in detail the operations carried out in the canals of the St. Lawrence series, which it is expected may be completed during the current year, with the result of securing a navigable depth of 14 ft. throughout the whole route from Montreal to Kingston. The expense will perhaps amount to two millions sterling, the returns for which are, however, considered as quite a subsidiary matter,—the light in which the State regards those works being, that on a comparison of its past with its present condition, "there can be no doubt of their having been of far greater benefit to Canada than the aggregate amount of their cost." The magnificent scale of those works may be judged from the dimensions of the canals, which are 200 ft. wide, while the locks are 270 ft. long, and 45 ft. wide. Similar particulars are given of the Richelieu, Ottawa, Rideau, and Trent Navigations, as well as a detailed descripton of the operations on the Welland, the most important of the Canadian canals, which affords a navigable connexion between Lakes Erie and Ontario for vessels of 2,000 tons. It is to be regretted that no statistics have been added of the traffic that passes through the Welland and other canals, which, notwithstanding the disadvantage of being closed by frost for one-third of the year, and the competition of parallel railway lines, accommodate an enormous trade at rates far below what the railways charge.

Great interest attaches at present to the

* Statistics of Hydraulic Works and Hydrology of England, Canada, Egypt, and India. Collected and reduced by Lowis D'A. Jackson, C.E., &c. London: W. Thacker & Co., 87, Newgate-street. 1885.

hydraulic works of the country next taken up in the book, viz., Egypt, and of which a very detailed account is given. Its irrigation works are similar to those in operation in the Indian Deltas, but from not having been as scientifically and carefully laid out they are of a rougher type and not so effective as they ought to be. Mr. Jackson likewise enters into a very full description of the hydrology of the basin of the Nile, including its levels and discharges at various points in the 3,000 miles of its course; and there is one fact of special interest to which a passing allusion is made, viz., the speed of the "flood wave." From the table of discharges measured at Gondokoro, Khartoum, and Cairo, an approximate guess as to that phenomenon may be made. The highest level and discharge at Khartoum in the year 1849-50 as measured on 1st of September was 22·70 ft., the corresponding maximum measurement at Cairo was on the 1st of October 23·30 ft., the relative volumes being 419,637 and 319,550 cubic feet per second, from which it would appear that the flood wave took thirty days to travel from Khartoum to Cairo, a distance of 1,800 miles, thus giving a rate of sixty miles per day or 2·5 miles per hour. The author, however, deduces the speed of the flood wave at the first rising of the river to have been 1·68 miles, while at its highest stage it amounted to 3·11 miles. The decrease in the flood volume between Khartoum and Cairo is a curious phenomenon; the solution, as given by Lombardini,—to the effect that one large portion goes to fill up the river bed from low-water to flood, and another portion is lost in the effiltration from overflows that return to the river after high flood,—may doubtless to a great extent be correct; at all events, it is of considerable interest in tending towards an explanation of the law of flow of underground water. Had the data regarding the flood wave been studied previously to the despatch of the Soudan Expedition, a tolerably accurate forecast might have been made of the probable state of the river at given dates along the principal points of its course, as well as of the conditions at the site of the various rapids, and might, political vacillation apart, by showing the necessity for an earlier start from Cairo, have been instrumental in saving the expedition from some of the difficulties which were encountered, and, by avoiding the delays occurring at the Rapids, might have expedited its movements and enabled it to accomplish the object for which it was despatched. It is to be hoped that sufficient and accurate data have been collected during that expedition to determine this important phenomenon more exactly. According to Mr. Jackson's tables, the lowest state of the river at Khartoum occurs in the month of May and at Cairo in June, the relative discharges then being 31,044 and 26,841 cubic feet per second respectively. With so large a minimum discharge, improvements to render the Nile navigable throughout its entire length ought to be perfectly feasible. The different degree in which water carriage is appreciated and dealt with in the Eastern and Western hemispheres is very marked. While every effort has been made, regardless of cost, to surmount the difficulties occurring in the great Western Continent, the rivers in the Eastern Hemisphere have been entirely neglected, albeit the Nile presents on the whole less formidable obstacles than those overcome on the St. Lawrence, and has larger and equally important lakes at its source, destined, very probably, at some future date, to form the summit level of a grand chain of water communications from west to east of the great "Dark Continent."

Little faith has till lately been placed in agricultural or any other statistics relating to Egypt, but the chapter on the productive value of land, compiled from a memorandum prepared by Mr. Nicolson so lately as 1883, may presumably be accepted as containing reliable data. It is stated therein that the value of the average yield from maize, beans, wheat, and cotton amounts to 8·75*l.* per acre, and from sugar-cane to 18·75*l.*, while the net return yields about 9½ per cent. on the capital outlay. The introduction of perennial irrigation is expected to enhance still further the value of the outturn, and if only the present able Minister of Irrigation Works is allowed to carry out his plans, the agricultural prospects of Egypt, as well as the Public Treasury, will be greatly benefited.

The latter half of Mr. Jackson's book is devoted to the hydraulic works of India, the statistics of which are given in great detail. An idea of the scale on which operations have there to be carried on may be gathered from the extent of country to be dealt with, comprising an area of one million and a half square miles, inhabited by 253½ millions of people. The magnitude of the schemes, and the size of individual works, will be apparent from the tabulated enumeration of the dimensions and volumes of some of the principal rivers, the flood discharges of which range from 380,000 to 1,800,000 cubic feet per second, and the breadths of which vary between one and five miles, with surface velocities of from four to seven miles per hour. The great interest of India, however, is centred in its irrigation schemes, without which a large portion of the country would be unable to yield any produce or food at all. According to Mr. Jackson's figures, nearly 24 millions sterling have been expended on the canals throughout India, for which outlay six millions of acres are irrigated, yielding in 1882-83 a gross revenue of 1,932,200*l.*, or a net revenue of nearly one million. Out of the above capital outlay, 5,000,000*l.* have been expended on works which have either scarcely yet come into operation or do not as yet yield a surplus revenue. The return of navigable canals in Mr. Jackson's statement is incomplete; but from the statements handed in to the Parliamentary Committee there must be in India about 3,000 miles of navigable canals, independent of the rivers and tidal streams. Besides irrigation from canals, there is a very extensive system from reservoirs, or, as they are locally termed, tanks, in Southern India. In the Madras Presidency they are especially numerous, some of them being of immense size, and almost all of them are the works of the ancient rulers of India. It is said that in Madras alone there are 53,000 tanks, having probably 30,000 miles of embankment, and 300,000 separate masonry works in the shape of weirs, escapes, and sluices, irrigating about three millions and a quarter acres, which yield an annual revenue of 1,500,000*l.*

It is impossible to attempt to enter into the details of the great schemes of irrigation which have been carried out in the Deltas and Doabs, or interfluvial tracts of North and South India, and we must, therefore, refer those interested in the subject to Mr. Jackson's book, where they will find the particulars fully detailed; but a few words on the works carried out in a country which is just now attracting considerable attention, Burmah, will not be out of place. Traversed by a magnificent river, which is navigable for hundreds of miles, whose flood discharge is nearly 2,000,000 cubic feet per second, and its minimum summer flow 46,000 cubic feet, the Delta of the Irrawaddy is liable to be so submerged over vast tracts as to render agricultural operations nearly impossible. The attention of the local administration has been, therefore, directed to reclaim the country as far as possible from those floods, but, inasmuch as the population is sparse and the expense of the embankments considerable, averaging 840*l.* per mile, the works can only be carried out by degrees. In 1882-83 the capital outlay on the western embankments amounted to 305,000*l.*, the net revenue to 46,289*l.*, the working expenses to 8,733*l.*, a sufficiently encouraging result to justify the prosecution of the scheme for reclaiming by marginal embankments the whole of the upper part of the Delta.

Mr. Jackson's book concludes with a short account of the works carried out in Ceylon, which may be briefly described as comprising 24,700 square miles, of which 4,000 square miles are mountainous, at an elevation of 3,000 ft. to 7,000 ft. above the sea. There are several very fine reservoirs in the island, some of which were constructed by its kings before the Christian era. The information available, however, is very meagre.

Mr. Jackson would doubtless himself disclaim the idea of perfect accuracy for the statistics contained in his book, but probably they will prove sufficient for the purpose he has had in view. At all events, he has succeeded in bringing together within a compact and readable compass a vast mass of information which could not otherwise be reached except at great expenditure of time and labour.

NOTES.

THE Report of the Council of the Institute on the draft of the new Charter, to be submitted to the general meeting on the 30th, is now in the hands of members. The report briefly summarises the principal points in the new Charter: the minimum limit of age for Fellows (thirty), the proposal for powers to institute an examination in the election of Fellows as well as Associates, the vesting of the property in the Institute and not in the Fellows alone, the proposal to grant a certificate of membership to those who wish for it, &c. The Charter is printed in full. Professor Kerr announces a motion of formal opposition to the proposed new Charter in all its parts, in order to secure full and free discussion of the whole subject. The Journal of Proceedings also contains a memorial to the Council from members in Liverpool, in favour of vote by proxy for non-metropolitan Fellows and equal advantages in every way for country members with London members, with a suggestion for considering the question of amalgamating all provincial societies in one chartered body having its headquarters in London, as "until such amalgamation is carried out it will be impossible to obtain State recognition." The Manchester Society of Architects issue a memorial to non-metropolitan Fellows to attend the meeting and secure the advantages they wish for by a preponderance of votes. So on the whole we may take it that the 30th will be a bustling evening at No. 9, Conduit-street.

AFTER a good deal of delay and warm discussion, the Main Drainage Committee of the Richmond Vestry have resolved to recommend the adoption, out of a list of five schemes in the competition, of Mr. Melliss's Mortlake Drainage Scheme, as that which, on the whole, offers the best prospect of settling in a satisfactory manner "the extremely difficult question of disposing of the sewage of the parish." The Richmond Vestry, at a special meeting held last week, adopted this scheme by a majority of 19 against 6. It may be mentioned that this scheme is similar to the one which was promoted by the Thames Valley Sewage Board, prepared by Messrs. Melliss & Mansergh, and sanctioned by the Local Government Board, but thrown out in Parliament because of the opposition principally of the Vestry which now adopts it. The site for the precipitation and filtration operations is the same as that which was proposed in the larger scheme objected to. But it is now argued that in the case of the larger scheme it was proposed to drain twenty-one parishes. Here the object is to drain only one, and the necessary evils of any drainage system are materially diminished. It is a well-known fact that nine-tenths of the houses in Richmond drain directly into the Thames; but it will soon be a penal act to drain any more sewage into the river. When this scheme is completed, and in working order, it is not too much to say that a serious source of pollution for the river in the upper reaches, as well as the lower, will be removed. Mr. Melliss's scheme embraces the conveying of the sewage, either of the Richmond parish alone, or the district of the Richmond Rural Authority conjointly, by means of a collecting sewer along the river bank at Richmond; and by a main sewer thence to Mortlake. It is proposed to purchase a plot of land near the riverside at Mortlake, of about eleven acres (which it is stated Captain Fitzgerald offers to sell for 12,000*l.*); and there deal with the sewage by chemical precipitation and filtration; the effluent passing into

the Thames. The total cost of the scheme, as applicable to the parish and the District Rural Authority, is estimated at 96,560*l.*

THE terrible conflagration which has swept away in a fiery wave upwards of 700 residences in Galveston is a fresh warning as to the need of readily available water supply, provided especially with a view to fire. In the great American cities water is usually supplied with a bounty that seems to us very wasteful. In the nine principal cities of the United States, each with a population exceeding 200,000 persons, the water delivered averages more than seventy gallons per head per day. This is double the London water supply, in the thirstiest time of the year. In Chicago, which was ravaged in 1871 by a fire that raged for four days, that swept an area of more than three square miles, and burned down 25,000 buildings, the present water supply, derived from the lake on the banks of which the city is built, is at the rate of 110 gallons per head per diem. This is a remarkable instance, not only of the burned child dreading the fire, but of the adoption of wise precautions against a recurrence of the evil. This magnificent supply is not only the most copious, but also the cheapest in the world. While the revenue derived from the Chicago water works is 10·26*l.* per million gallons, the actual cost of that supply is little more than a tenth of that price, viz., 1·11*l.* per million gallons. In these two terrible fires the buildings were chiefly of wood, and the conflagration once on foot was strong enough to mock all attempts at extinction. We ought not, however, to forget that in that quiet and easy pavement which is now spreading over London lies a source of possible danger in the case of a great fire. It is rather to constant watchfulness, to the regular testing of every source of water supply, as to its accessibility and working order, and to instant action when fire breaks out,—than to any other precaution, that we must look for the safety of London.

THE condition of the iron trade is not reassuring. The small-chainmakers in South Staffordshire and East Worcestershire resumed work, on the 13th current, after a nine weeks' strike, at the wages against which they struck. The present average price for all-mine pig-iron is 60s. per ton, while common or cinder iron is sold at from 40s. to 37s. 6d. per ton. But, at the same time, the Belgian prices have fallen to 39 francs, and the Luxembourg makers have reduced their price to 35 francs per ton. In face of this difference of price, it is perhaps intelligible why in Glasgow,—the very centre of one branch of the iron trade,—the new Municipal Buildings should be constructed with iron from Belgium. But it is none the less unpleasant as a fact, however it may be explained. In textile industry, the notice of Messrs. Marshall, of Leeds, the largest flax-spinners in England, that they are about to close their works, adds to the gloom of the winter outlook. It is idle to wait for better times, in presence of facts like these. It is incumbent on those who care for the future of the industry of the country to prove the causes of the existing depression. How far it is possible to obviate them is a question that can not be rationally discussed till we know thoroughly what they are.

IN the action of Conway *v.* Clemence, heard in the Queen's Bench Division on Saturday last, before Mr. Justice Manisty and Mr. Justice A. L. Smith, the plaintiff, who was a bricklayer employed on a house being built by the defendant, and had been struck on the head by a brick which had fallen down the well of the staircase, had obtained a verdict of 50*l.* damages in the Westminster County-court (under the Employers' Liability Act), on the grounds (1) that the well-hole on the ground-floor of the house had been of an unreasonable size, (2) that the large size of the well-hole had been the cause of the accident to the plaintiff, and (3) that its large size had constituted "a defect in the condition of the plant or works" of the defendant. The latter claimed that the verdict should be set aside, as the mere size of the well-hole was not "a defect in the condition of the ways, works, machinery, or plant connected with or used in the business of the employer," and the brick was let fall by men in the employ of a sub-contractor to the defendant. The judges ruled that the word "plant" did not include the carcass of a house, nor width of the well a defect. Judgment was accordingly entered for the defendant. The case is a hard one for the unfortunate plaintiff, but it shows that in point of law he must have been wrongly advised from the first, and that it is very important for workmen in such cases to be sure of their legal ground before availing themselves of the provisions of the Act.

WE learn that an institution for instruction in "the European style of sculpture" has just been established at Ushigomi, Tôkyô, Japan, under the patronage of a number of high native officials. Students are admitted free of charge. This looks as if the Japanese were waking up to the fact that they cannot draw or model the figure in a serious sense, although they show such admirable faculties for humorous travesty. But it may be seriously doubted whether they are taking the right course in trying to follow European sculpture. If, without attempting imitation of Western art, they were to endeavour to develope their own unquestionable powers in grotesque modelling of the face and figure in a more serious line, they might in the end establish a new and original school of sculpture, instead of aiming at a second-hand edition of European art.

THE highway from Edinburgh to Queensferry is acknowledged to be one of the finest roads in the kingdom. This highway did not at once assume its present form, but is the result of various improvements which have been from time to time effected, the starting-point having been the erection of the Dean Bridge, which spans the gorge of the Water of Leith, and which forms one of the many picturesque points in the city. Before the erection of the Dean Bridge the exit from the city to the north-west was by a narrow, tortuous road, passing over the Water of Leith by a low-level bridge at Bell's Mills. This bridge has for some time been considered insecure, and the necessity for an exit in this direction from the newly-formed quarter at the west end has rendered it necessary to supersede it by a new bridge. This bridge is to form a continuation of the roadway of Palmerston-place, which has just been completed, and, in order to attain the higher level, part of the old Queensferry-road will be raised by 24 ft., the total height of the new roadway above the stream being 52 ft. The design of the new bridge, which has been entrusted to Mr. Cunningham, C.E., shows a single arch with a span of 68 ft., with a breadth of 40 ft., including the parapets, which are to be constructed of granite and embattled. The rest of the structure is to be formed of ashlar in courses. At the abutments are to be broad projecting pilasters, above which are to be panels containing the city arms, and beneath the parapet there is a projecting dentilled string-course. The estimated cost of the work is about 15,000*l.*

WE regret very much to hear that the picturesque old gateway called the "Stone Bow," which may be said to be "The Temple Bar of Lincoln," is threatened with destruction by the town authorities. The reason given is, of course, the same as that which led to the unavoidable removal of Temple Bar, viz., that it blocks the traffic. In regard to Temple Bar this was a real and palpable evil which could not be overlooked, considering the immense traffic along Fleet-street, which was year by year increasing. But Lincoln, unless it be changed much since we last saw it, is no busy town of crowded traffic, where every one is in a hurry, but a quiet cathedral city of the antique type. The Stone Bow has only a single carriage way, it is true, but a resident writes that it is rarely that a carriage is delayed. It is surely better that there should be a little occasional delay, if that is all (and of that we cannot speak from observation), than that a city like Lincoln should be denuded of so characteristic a monument.

WE published last week a letter from one of the competitors for a villa competition, premium 10*l.*, complaining of the proprietor in advertising the result. From a letter we have received from another competitor, it appears that 200 designs were sent in (!), and that the unsuccessful competitors have not got their drawings back. We hope the person who advertised the competition is attending to his duty in this respect, and is not overwhelmed with surprise that so many fish should be attracted by so small a bait.

THE copy of the ancient city cross of Edinburgh, commissioned by Mr. Gladstone, is now completed, and, although it forms an additional object of interest in the city, we cannot say much in its favour as a work of art. The original structure was of great value as an ancient relic and on account of the associations connected with it, and had it been possible to restore it the time and labour might have been considered as profitably employed. The present structure, with a trifling exception, is new, and an admirable specimen of mason's work it is; but that is the best that can be said in its favour. Mr. Sydney Mitchell has done his part as superintending architect most efficiently, but had he been entrusted with the production of an entirely new design we have not the least doubt that the outcome would have been something worthy of admiration.

THE new church of St. Michael and All Angels, Walthamstow, was consecrated on Wednesday last by the Bishop of St. Alban's in the presence of a large congregation. The building has cost over ten thousand pounds, and is a large and lofty structure of rather original design and effective proportions. It consists of a nave of six bays, with rather narrow aisles, and a chancel with an organ-chamber and spacious vestries on the south side, the mourning chapel is in the east bay of the north aisle, and there is a baptistery at the west end. The walls are of stock bricks, with a considerable proportion of red brick and stone in the dressings, and a heavily-timbered open roof covered with tiles. Funds are still wanted to complete the north porch and to erect an isolated tower. The works have been carried out from the designs of Mr. J. M. Bignell, by Messrs. Adamsons, the contractors.

AN interesting work on decorative art is to be brought out shortly by Mr. Quaritch, consisting of a series of illustrations, drawn and coloured by Mr. Vacher, of designs taken from the dresses and stuffs shown in Italian paintings in the National Gallery collection. Mr. Vacher has made a number of careful coloured studies from these, a good many of which we have seen, and which are to be reproduced in chromo-lithography. The idea is a new and happy one.

THE Association of Diamond Merchants have just fitted up one of the shops under the Grand Hotel in a sumptuous and novel manner, for the purposes of their business. Messrs. Romaine Walker & Tanner, who designed and carried out the work with exceptionally good taste, have cleverly contrived to use every inch of the space at their command without cramping any part. The shop window is arranged with a recess in which people may stand to admire its contents out of the way of passers-by on the footpath. Inside there is a gallery at the back where purchasers may see their diamonds weighed in the delicate balance kept for the purpose, and in the basement is the workshop, where they may see them set. There is an office for the manager under the gallery, and a cosy ingle by the fireplace behind the stair to the gallery. All the detail is pretty, and the square-turned balusters are particularly effective.

WE understand that the Society of Lady Artists, with the addition of many new members, will hold its Annual Exhibition of Oil and Water-colour pictures this winter at the Egyptian Hall, Piccadilly. The Exhibition will be opened in February, 1886.

ONE of the architects who gave evidence before the Westminster Hall Restoration Committee in favour of Mr. Pearson's scheme has written to us in reference to our paragraph anent Mr. Fergusson's article last week, about which our correspondent seems to have lost his temper, and insinuates that we are not representing the truth in saying that the scheme was "mainly prompted by superstitious reverence for a piece of Norman walling." The expression is a general one, not intended to be taken *au pied de lettre*, but it is borne out by the history of the whole affair, and even by detailed items in the published evidence, *e.g.*, from Mr. Pearson's own evidence :—

"Question 326. I think your real motive for all this is to preserve the old Norman work?—Yes; all the evidences of the old Norman work are along that wall.

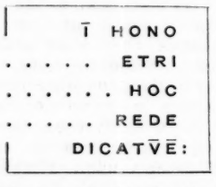
327. And that is the great motive of the design you have made?—*That was the great object I had in view*; and to turn the space within to the best account."

What does our correspondent say to that? The fact that the same view occurred to Mr. Fergusson and ourselves, who are quite independent in the matter, is in itself an indication that there is reasonable ground for it.

THE NEWLY-DISCOVERED SAXON CHURCH AT DEERHURST.

RECENT discoveries in the historic site of Deerhurst, in Gloucestershire, not far from Tewkesbury, have brought to light several antiquarian facts which render it imperative that the history of that archaic spot should be rewritten; for all existing accounts, when examined by the light of what has been lately explored, are untrustworthy and incorrect. Forty years ago Mr. Daniel D. Haigh described the church for the British Archæological Association, and collected a quantity of useful notes relating to the history of the foundation and fortunes of that building. Later, the world of archæology has become indebted to the veteran architect, Mr. J. C. Buckler, for a very valuable essay on the architecture of the church, which still remains unpublished, among the manuscripts preserved in the British Museum, although there are hopes that one of the County Archæological Societies will before long publish a considerable part of it. Deerhurst Church has also contributed numerous details of architectural illustration to all the text-books of the architectural student. But until the summer of the present year no one had any other idea than that all that could be known of Deerhurst had been long investigated. Not far, however, from the church,—of which we do not propose to say more on this occasion than that it is one of the few specimens of the class of Early Anglo-Saxon churches, much disfigured by late alterations,—stands "Abbot's Court," which had belonged to the chapter of Westminster from a very early period, about 120 yards to the south, and somewhat nearer to the river Severn, which runs nearly north and south on the west. This, as it now stands, is a large irregular farmhouse, built at various times; its eastern portion is a fine-timbered erection of about the sixteenth century, and communicates with the centre part of the house, which is, in fact, an old church, which by the introduction of a flooring, has been converted into a series of apartments on the basement and the upper floor.

On the west side, communicating with this central portion, comes a third erection, more modern than the eastern part, but still of considerable age. This farmhouse happens to be untenanted at present, and it is owing to this that the discovery has been made. From the information conveyed to the British Archæological Association last Wednesday (18th inst.) by the Rev. G. Butterworth, vicar of Deerhurst, it appears that the Ecclesiastical Commissioners are converting two farms into one, and the tenant farmer will not, in future, inhabit Abbot's Court. This edifice was handed over to a local builder (whose careful desire to preserve the old work deserves great praise) for the purposes of repair, with a view, it is thought, of converting the "Court" into one or more cottages. All that was known about the building until about three months ago was that a portion of it was very old because of the unusual thickness of the walls. The discovery of the true character of the place arose in the following manner:—Mr. Butterworth, who had often inspected the old walls, fancied that the plaster with which the walls are covered in one place showed very faintly the appearance of a semicircle. One day the workmen employed on the alterations cut down a fruit-tree close to a large chimney-stack belonging to the sixteenth-century portion, and the vicar immediately discovered an inscribed stone which the tree had, until then, concealed, built into the wall. Unfortunately, the stone has been seriously mutilated, and the centre is completely cut away, as if the stone had been used for the head of a lancet window, but the portion remaining leaves sufficient to prove its real nature and import. The remaining letters are:—



This, which is undoubtedly the dedication slab of the altar, has been explained by the vicar to read:—"In honorem Sancte Trinitatis hoc altare dedicatum est" ("This altar was dedicated to the honour of the Holy Trinity"). "Sancte" for "Sanctæ," we presume. It has been conjectured,—and, we think rightly so, if the forms of these letters on examination do not point to the earliest appearance of Christianity at Deerhurst (which, as we shall presently show, is not later than A.D. 804), rather than the second foundation some time before A.D. 980,—that this inscribed stone owes its existence to one of the Acts of the Council of Celchyth, presided over by Archbishop Wulfred, on the 27th of July, A.D. 816, viz., that bishops were to take care that the saints to whom the churches were dedicated were to be put up on the wall of the oratory or on a tablet, or also on the altars. The exact words are worthy of record, as found in an ancient manuscript in the Cotton Library of the British Museum, Vespasian A. XIV., published by Haddan & Stubbs, Councils, vol. iii., p. 580, and others who have studied the history of the English Church. They are:—"Præcipimus unicuique episcopo ut sciat depictum in pariete oratorii aut in tabula, vel etiam in altaribus, quibus sanctis sint utraque dedicata." This injunction was obeyed at first, and for some time more or less strictly, as at St. Martin's, Canterbury, and at Castor, in Northamptonshire; but from the dedication stone of the Abbey Church of St. Paul, Jarrow, which bears a date of the fifteenth year of King Ecgfrid, and the fourth year of Abbot Ceolfrid, *i.e.*, A.D. 685, it is clear that the canon quoted above rather seeks to enforce an old rule than to inaugurate a new one.

One day the vicar called the attention of the builder, Mr. W. Collins, of Tewkesbury, to the appearance of the plaster about 12 ft. above the ground, and, on procuring a ladder, a circular-headed window was opened out, which had a splay both inwards and outwards, but no ashlar-work. Subsequent examination of the so-called pantry of the farmhouse showed two large stones, about 6 ft. or 7 ft. apart, and about the same height from the ground, which looked like imposts. These simply stood out from the plaster, and close to one of them was and is a brick prop. Meanwhile plaster and whitewash, and features added at various and late times, concealed all besides. It was difficult to conceive an arch above these imposts, and solid ashlar jambs below, and they thought that the old building ended with the chancel-arch, although they saw in the north-east angle of what proved to be the chancel an Early English bracket. At last they discovered that these two stones were massive imposts, which will be described more in detail presently, and that beneath them were very solid ashlar jambs, with irregular long and short blocks disposed at the angles in alternate courses. Above the imposts an arch was turned, somewhat inclining to the horse-shoe shape, so clearly indicative of the oldest period of Anglo-Saxon architecture, unless the appearance be due, as it is known to be in some cases, to the settlement and inclination of the piers from which it springs. The centre of this arch, which turned out afterwards to be the chancel-arch of the church or chapel, is manifestly at a considerable distance above the line drawn from the upper edges of the imposts. Unfortunately this fine arch has been cut in half about 1 ft. above the impost on one side; that is, one side of the arch is lost from about the centre to 1 ft. above that impost. The arch, however, has been propped up. It was only by degrees that it became apparent that on one side of this arch was an ancient nave, on the other a chancel, of a small chapel; for at first it seemed to be an ancient dwelling-house, with an upper floor, and a huge fireplace at one end. The walls of the building have now been partially cleared, and the vicar does not expect to come upon many more ancient traces.

In plan this ancient edifice consists of but two portions, nave and chancel, divided by the very solid chancel arch above described, the width from jamb to jamb being 6 ft. 6 in. The extreme outside length of the work is 46 ft.; length of nave, 25 ft. 6 in.; length of chancel, 14 ft.; width of chancel, 11 ft. 2 in.; thickness of chancel walls, 2 ft. 3 in.; thickness of outside walls, 2 ft. 6 in. The south wall, and southern half of the eastern wall of the chancel, have been destroyed; the other walls are sound, and from their massive character they will with fair treatment remain practically indestructible. There are traces of the south door about one-third of the length of the south wall from the west. Opposite to this, on the north, is the north door, now blocked up. Its jamb consists of six ashlar blocks, of irregular size, capped by an impost of two members, each about 3 in. thick, the lower one only slightly projecting beyond the jamb; the upper one projects more boldly, and is ornamented with a semicircular moulding. Above this impost a low semicircular arch is turned, with segments of stone. The total height of opening from ground to top of arch inside is very nearly 8 ft. On the north wall, at about one-third from the eastern corner of the nave, and corresponding in position eastward to the blocked-up door westward, is an altered window. Exactly opposite to this, on the south wall, is the splayed window already referred to. The sill of this is about 10 ft. 6 in. from the ground. The opening is about 2 ft. 6 in. wide by 3 ft. 3 in. high. This also is round-headed. But the most interesting feature of this part, and one which unmistakably points to a high antiquity fo the original fabric, is the method of the construction of its voussoir, which is not of ashlar work, but of thin slabs or tiles arranged like the well-known fragment of the Roman building at Leicester; the Roman gate at Lincoln; the arches at Brixworth Church, Northamptonshire, and Porchester Castle, Hampshire; the windows and other parts of the old church in Dover Castle; and the work on the south side of Brytford Church, in Wiltshire. In the centre of the north wall of the chancel is a large sixteenth-century window, which it is not necessary to particularise here; and in the angle near it an Early English bracket of a simple character. There do not appear to be any indications of a window either at the chancel wall or at the west end, although it is not unlikely that at the chancel, at least, there was a window of small dimensions, which further investigations may reveal.

The chancel-arch, which now remains to be described, is exceedingly interesting, for many reasons. It possesses unique features for an arch of the Anglo-Saxon style, and is almost the only ornamental part (if we may use the term of a building almost entirely devoid of ornament) of the whole structure, which, from the severe simplicity of its ground-plan and the primitive character of its doors and window,—comparable, in some points, with the debased Roman work which entered so strongly into design of the oldest class of this style,—must be referred to a very remote period, for which we have, happily, documentary as well as lapidary and ecclesiological evidence. The arch is composed of two massive jambs, 2 ft. 3 in. wide, about 5 ft. from the old floor-line, and 6 ft. from the foundation of the lowest course of stone. The large blocks used in this course support irregular long and short work of six courses, looking east towards the nave, and five courses more approaching the normal proportion

of long and short angle work on the side looking west towards the chancel. Upon these are the imposts, which consist of four members. The lowest, about 2½ in. thick, is chamfered or mitred along the whole face, at an angle of about 60 deg. The second and third members, taken together, are about 4½ in. thick, with hollow moulding, not quite semicircular in section, the upper one of the two slightly thicker, and each having a narrow strip or flat band to separate it from the next stone beneath it. The fourth tier or abacus is of larger dimensions, being fully 3 in. thick and having a bold circular moulding. The aspect of this capital or impost, 10 in. in thickness, is very pleasing, and is probably unlike any yet recorded for the period under observation. From it springs the arch which, as has been already pointed out, is of decidedly a horse-shoe form. The masonry on the side looking west towards the chancel is of somewhat irregular outline, but on the side looking towards the nave the stones are of regular proportion, and a narrow rib or strip of stone runs round them and dies into the abacus. The total height of arch from the old floor-line is about 10 ft. 3 in. inside opening. We may venture to assert that no future work on Anglo-Saxon ecclesiastical architecture will fail to point to the composition of this feature in the chapel as one of the highest interest. With regard to the plan, its simplicity is an unerring test of its age. Comparing the old church at Bradford-on-Avon (which, by the way, was also discovered quite accidentally by the late Rev. W. H. Jones), to which the late Mr. J. H. Parker, C.B., one of the best ecclesiastical antiquaries of his time, attributes the date of A.D. 705, we are struck with the general resemblance of proportion, the absence of east or west windows, and the north and south doors facing each other, but in the Bradford church in the middle of the wall length. But it must be admitted that the important and proportionally capacious porch at Bradford, contemporary in execution with the rest of the fabric, finds no corresponding structure at Deerhurst, and, therefore, it is fair to presume that the Deerhurst chapel points to a more remote antiquity.

We may say a word, before passing to the historical evidence which bears upon this ancient building, with regard to its future. To convert it into a cottage or cottages,—however picturesque and commodious they may be,—would be to outrage all ecclesiastical and antiquarian propriety. The buildings which have been set up against the original stone fabric may very appropriately be removed, but it will be hardly a suitable thing to house whole families of agricultural labourers within the undoubtedly consecrated walls of this church, newly rescued from an oblivious and degraded fate. One of the first steps taken by the Rev. Prebendary Jones after his discovery at Bradford-on-Avon, was to clear away the floors and tenements which, strange to say, in that case also had choked up the Saxon church which now stands out prominently among the ancient ecclesiastical glories of a county already rich in other examples. It is manifestly the duty of those in whom the property is (for the present, shall we say?) vested to remove the flooring, clear and point the walls and masonry, repair the roof, and thus make an undivided space or hall, which could certainly in such a place as Deerhurst, contiguous to the populous town of Tewkesbury, be adapted to far more lofty uses than that into which it is most likely after all it will drift. The rescue of Steetley Church, Derbyshire, from roofless and utter ruin, and its successful application to the spiritual needs of the neighbouring mining population, is, not to mention other cases, a splendid example of what may be done by energetic exertions.

It remains to determine the age and uses of this edifice when examined by the light of ancient literary records and other antiquities. The historical notices of Deerhurst have, however, always been taken to point to the present parish church, no doubt the relic of a very ancient monastic establishment. Thus Dugdale and his editors, Haigh, in the treatise mentioned at the beginning of this notice, and others, have recorded that the original foundation, mentioned in a document of the early date of 804 (see Kemble, "Codex Diplomaticus," and Birch, "Cartularium Saxonicum" under that year), whereby Æthelric, son of Æthelmund, alderman of Worcestershire, granted to the monastery some valuable estates on condition of burial therein and commemorative services by the monks, was destroyed by the Danes, who penetrated the neighbouring district, and devastated it towards the end of the ninth century. It was, however, rebuilt, and must have been in activity in A.D. 980, for Athelwold, bishop of Winchester, was, as we are told by William of Malmesbury, in his "Gesta Pontificum," or "History of the Bishops" (p. 109, Hamilton's editior), succeeded by Elphege, who had taken the habit at "Dirhest," at that time a small cell (*exiguum cenobium*), but at the time of the writer, A.D. 1125, an empty ruin (*antiquitatis inane simulacrum*). It is difficult to apply this latter description to the larger church at Deerhurst, which few will claim for it. It is clear that the monastery was in existence in 1006, and that Edward the Confessor, about the year 1056, had caused the monastery to be rebuilt, and given it, with its lands, to the Abbey of St. Denis at Paris. William the Conqueror confirmed this gift in A.D. 1069, and in A.D. 1250 it was sold by the monks of St. Denis to Richard Earl of Cornwall. But these words of William of Malmesbury would accurately designate the desolate condition of the "little cell," if we are right in conjecturing it to be this newly-discovered chapel. Close to it, in the year 1675, there was found in the adjacent orchard, a large stone, now preserved in the Ashmolean Museum, Oxford, bearing the following inscription in bold characters:—"+ Odda dux jussit hanc regiam aulam construi atque dedicari in honore S. Trinitatis pro anima germani sui Elfrici que de hoc loco asumta est. Aldredus vero episcopus qui eandem dedicavit ii idibus Aprilis xiiii. autem anno regni Eadwardi regis Anglorum." The intent is that "Duke Odda ordered this royal hall [*i.e.*, chapel] to be built and dedicated to the honour of the Holy Trinity for the soul of his brother Elfric, which was taken up at this place. Bishop Aldred dedicated it on the 2nd of the Ides of April, in the fourteenth year [*i.e.*, A.D. 1056] of King Edward [the Confessor]." A Tewkesbury Chronicle in the British Museum records that the two noble brothers Oddo and Doddo, who are buried at Pershore, had a brother Almaric (the Elfric of the above inscription), who "was buried at Deerhurst, in a small chapel opposite the gate of the Priory, because that *chapel* was formerly the *royal hall*," and proceeds to quote an inscription which appears to be a variant form of the one given above. From the Anglo-Saxon Chronicle, the works of Florence of Worcester, Kemble's Collection of Charters, and other sources, the history of these three illustrious brothers may be gathered as follows:—Oda, or Odda, the thane or nobleman, first appears in A.D. 1015; Odda and Dodda, together, in A.D. 1031; Ælfric appears with them in A.D. 1042; Odda is made Earl of Devonshire, Somersetshire, Dorsetshire, and Wales in A.D. 1048; and commands the English fleet in A.D. 1052; Ælfric dies at Deerhurst, and is buried at Pershore in A.D. 1053, having first turned monk; on the 31st of August, A.D. 1056, Odda, having also become a monk, dies, and is buried at Pershore. The last notice of Doddo is A.D. 1062, when he is styled a Prince. Mr. Butterworth claims that this inscription, hitherto considered (even by Mr. Parker amongst others) to belong to the larger church, properly belongs to the newly-found chapel, and with much reason. The situation of the finding of the stone, the simple memorial character of the edifice, evidently adapted to commemorative rather than ceremonial services, and its contiguity to the larger church, which would render it useless for other purposes, all strengthen this idea. Future researches may, perhaps, tend to favour the former theory, and we trust nothing will be left undone to solve the obscure points of the history, and to protect this ancient relic from injury; but for the present we must be content to admit that the monastic history of Deerhurst has been seriously misunderstood, and must be re-arranged to agree with this recent and interesting discovery.

The New West Ham Police-court.—This Court was opened last week, the Stipendiary Magistrate, Mr. J. Roland Phillips, describing it as "one of the most handsome, suitable, and compact courts in the Metropolis." Mr. Lewis Angell, F.R.I.B.A., is the architect; and Messrs. Palmer & Sons the builders. The cost was 5,500*l*.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

The second meeting of the present session was held on Monday last, Mr. Ewan Christian (President) in the chair.

The decease was announced of Mr. George Smith, Associate, of Chester.

The President said,—I have an announcement to make in reference to the Charter. In the Report on the proposed application for the grant of a new Charter which was issued, together with a draft of the same, on the 31st of July last, a hope was expressed that members would make themselves familiar, during the recess, with the provisions of that draft, and they were asked to send in, before the 7th inst., any amendments to it which they might think desirable. This has been done, and some proposed amendments have been received, as was requested, which have been carefully considered by the Council, who, moreover, are much indebted to members for many valuable suggestions, some of which are none the less valuable on account of their informal character. This draft of the proposed Charter will be published in the Journal of Proceedings to be issued to members on Thursday, the 19th inst., together with a Report from the Council on the subject. A special general meeting will be summoned for this day fortnight (November 30th) at seven p.m., the specific purpose of which will be "to consider the draft of the proposed Charter with a view to an application to the Queen in Council for the grant of the same." I wish also to give notice that, it being absolutely essential for all amendments or motions (in respect to the draft of the proposed Charter) to be in the hands of members prior to the 30th inst., notices of such formal and specific amendments or motions should be sent to the office of the Institute, so that the same may reach the Secretary not later than four p.m. on Thursday, the 26th inst. Such notices, to be printed the same night, will be issued on the 27th inst., by letter post, to all Fellows, Associates, and Hon. Associates resident within the United Kingdom. Only such amendments or motions of which notice has thus been given and distributed will be considered at the special general meeting above mentioned.

Mr. William Woodward then read his paper, entitled "London as it is, and as it might be," He began by saying that a considerable portion of his paper was taken up with complaints of matters as they now existed, but he asked his hearers to believe it was in no hostile spirit that he had ventured to bring forward so great a subject. His only desire was, if there was room for improvement, that the attention of the authorities should be directed to the matter. The person most concerned was the dweller in London, for it was clearly certain that what was adequate for a population of two millions was insufficient for the immense population of the present day. They had not now the advantage of a large area of bare land on which to design a grand city regardless of cost, vested interests, and opposition; but, on the other hand, there was a city so advantageously situated and so capable of lending itself to improvements, that what was wanted was some vast change in the administration of the laws. They might approach the subject, then, as one which, in part or in whole, must sooner or later be taken in hand by the Legislature. Considering the matter in this light, it would not be necessary to enlarge on the origin or foundation of the city. Dealing with London before the Fire, Mr. Woodward described its appearance and the endeavours made in the reign of Queen Elizabeth to stop the growth of building and population. It was easier, however, to check the growth of building, than the increase of population, so that the houses of the poor were crowded together, and when the Plague broke out the alarmed authorities enlarged the building area, and extension had been the word ever since. In the time of Charles II. the sanitary condition of London must have been a subject of anxiety, the plague carrying off no less than 100,000 souls. This was followed by the Great Fire, which consumed nearly five-sixths of the city within the walls. The ruins covered 436 acres, fifteen of the twenty-six wards were destroyed, and eight others partly burned down. The fire consumed 400 streets, 13,000 houses, 89 churches, besides chapels and many stately edifices, the amount of property destroyed being

computed at ten millions sterling. If ever a golden opportunity for rebuilding the city was lost, it was after the devastation of the Great Fire, the result being that London was now the inconvenient network of thoroughfares which the absence of a controlling authority had permitted it to become. Reference was next made to Sir Christopher Wren's plan for re-modelling London, which showed the conception and grasp of its accomplished author. In the reign of Queen Anne, party-walls were first directed to be made of brick or stone; in the time of George III., the general lighting of London by parish assessment was adopted, and paving commenced, and an Act passed to remove the enormous signs which hung across the streets. In using the term "London," he included the City and its liberties, Westminster, Southwark, &c. In 1801 the population numbered 959,000; in 1821 it had increased to 1,263,595; in 1871 it reached 3,883,092; while it was now over 4,000,000, and was increasing at the rate of 20 per cent. every ten years. The rateable value of property was now about twenty-eight millions sterling, having increased nearly five-fold in the last twenty-three years. Reference was next made to the municipality of the City, and its various duties, Mr. Woodward stating that though there was in many particulars room for improvement, with the exception of the thoroughfares, the other matters coming under the control of the Corporation were in a fair condition. The Holborn Hill improvement was a most important work. He next touched upon the constitution of the Metropolitan Board of Works, and its great achievements, — the Thames Embankment and the Main Drainage, —and dealt with the work of the vestries. It was interesting to note what had been done to preserve the health of the population of London, and the different Acts which had been passed showed the enormous pains the Legislature had taken to meet the necessities of the case. Many of the Acts relating to the sanitary government of London, however, appeared to be utterly unknown to the authorities, and reference was made to the paucity of medical officers, analysts, and sanitary inspectors in some of the great parishes of the metropolis. What education or special training, he asked, had the sanitary inspectors received? Such men should be compelled to pass an examination, and should receive a far higher salary. In the case of the Metropolitan Board of Works, he would ask whether the high anticipations which had been formed of that body had been anything like realised? It was no part of his business to inquire whether the staff of the Board was sufficient; but somehow, it seemed to him, at least, that they succeeded in doing that which was wrong. In the case of Northumberland-avenue an opportunity for a little architectural effect had been for ever lost, while the road levels were awkward, and the crossings dangerous and badly lighted. The result was that what should have been a strikingly grand avenue presented quite a different appearance, detrimental to the avenue itself, and to the buildings fronting upon it. Great hotels had been allowed to bury smaller buildings, and completely crush them out. He did not mean to say that the hotels should have been kept down to the height of the inferior buildings, but some proper average height might have been contended for, so that there might have been a comparatively uniform street. The Oxford-street and Gray's Inn-road improvements were next touched upon. In the latter case, Mr. Woodward dwelt upon the cruel manner in which, he contended, the plots were set out, particularly in regard to St. Alban's Church, and reference was made to the plan of Mr. Isaacs, and that of the Board, which were displayed on the walls of the Institute. Had the plan submitted by Mr. Isaacs been followed, the west front of St. Alban's Church would have been opened up, and a good architectural effect gained, which now had been completely lost. Turning to the improvements in the neighbourhood of Piccadilly-circus, a new thoroughfare had been pitched into Oxford-street, at nearly right angles, the public-house and distillery remaining to utterly destroy the effect of the scheme. This new street, much to its surprise, found itself breaking into Piccadilly-circus, opening up in its tortuous windings some curious remnants of dilapidated architecture. Surely, said Mr. Woodward, the Metropolitan Board of Works was a subject for much wonder! The whole of these new thoroughfares would doubtless prove excellent for cab routes, but they were not yet able to speak of the architecture which would eventually decorate them. The Board deserved some credit for preserving the open space at Tichborne-street; but he drew attention to several projections which had been permitted, although the Board had complete control over the line of frontage. The Metropolitan Buildings Amendment Act, 1878, had been broken in many of its provisions. It was quite lamentable to walk through many of the thoroughfares made by the Board, where plots were lying idle as receptacles for filth and rubbish, to the general deterioration of the character of the neighbourhood. This would continue while the Board held out for rentals which it was difficult to obtain, and offered no incitement to any one to become lessees or owners. In connexion with the new Government Offices, he compared the proposed plan with that by Mr. Robertson and himself, and hoped that the public would insist on the plan of the Office of Works not being carried out. Mr. Edis had referred the other night to the desirability of bringing the question before the public, and he might say that the whole subject had been discussed in the Press during last September, and that the greater part of the correspondence could now be obtained in pamphlet form. Turning to the question of the dealings of the Corporation in regard to frontages, he drew attention to the projection at Sion College, which was being brought out to the footway of the Embankment, entirely cutting off the view of the west end of the City of London School. What could be said in the case of the freeholders allowing such a thing to be done? Censure should be given at once, and the offensive projection pulled down. Thus were the interests of the metropolis injured by the neglect of the constituted authorities. Mr. Woodward merely indicated the remainder of his paper, stating that it dealt with many subjects, such as drainage, water supply, dust removal, fire-escapes, subways, &c. In the matter of hoardings, he drew attention to a case in which hoardings had been heightened, and kept up, apparently for the display of advertisements. Open spaces, again, were all being covered by bricks and mortar, and this question had been all through regarded as everybody's business, with, of course, the usual result. Many open spaces which not long ago were close to central London, had been entirely built over; and, when they came to the outlying suburbs, what controlling power had attempted to stop the cruel occupation of open spaces? The Metropolitan Board and the Corporation had, no doubt, secured spaces of great value, but not before an outcry had been raised, and the outcry would have to be irresistible if Parliament Hill was to be secured as an addition to Hampstead Heath. Open spaces in front of buildings might have easily been secured, if the Metropolitan Board had kept their eyes open, but the condition of many of the thoroughfares showed how golden opportunities had been missed, and bricks and mortar allowed to encroach. Euston-road, for example, might have been made a splendid boulevard and fitting approach to the Metropolis, but, by reason of carelessness or worse, the parochial authorities had neglected their duty, and disgraceful encroachments had been made. The parks and open spaces of Greater London gave a rough total of 15,000 acres to a population of 5,093,995, or one acre to nearly every 330 persons; while the inner ring of London, with its 4,019,000 souls, had not more than 4,000 acres of open spaces, including squares, or only one acre to every thousand inhabitants. This compared badly with Paris, which had one acre to every thirteen people, or Vienna with one acre to every hundred. He then suggested a few points which might ensure a better observance of the Acts of Parliament. The whole of those which affected London should be repealed, and one new Act framed, embodying the present Acts, with additional clauses to make it complete. A copious index should accompany the volume, and a careful record be kept of all disputed cases. A plan of London might be made, showing merely the sub-divisions, marked for reference; each district having its own resident surveyors and other officials, so that one could see at a glance which officer was required for any particular place. A Department of Works should be created, with a permanent Minister at its head, with two permanent acting Under-Secretaries, and an adequate staff. There should also be an efficient staff of architects, to whom all matters of rebuilding could be referred; while a body of well-qualified surveyors should be employed, at such salaries as would command good men. Power should be given to enforce the minor provisions of the Act, but the more important ones should only be enforced after consultation with the Under-Secretaries or the Minister. A staff of efficient sanitary inspectors should also be appointed, to act under the guidance of the surveyors. Yards should be provided at different points, containing the necessary materials and appliances, with workmen to carry out the regulations of the Department of Works in the event of persons served with notices failing to comply with them. Mr. Woodward exhibited a plan showing how the streets should be widened, so as to open up approaches to railway stations and public buildings, the formation of wide quays by the side of the Thames, the erection of new dwellings for the poorer classes, and for many other improvements. Then would London become what the richest city in the richest country in the world should become, a model of spacious suburb and commodious outlay, inhabited by a healthy and prosperous community. Then, in the language of Voltaire, "May Heaven send some man, some statesman, sufficiently zealous to undertake such projects, with a mind firm and enlightened to carry them out, and may he have trust enough reposed in him to make them a success. If in our immense city no one can be found to do this,—if we are contented to talk of it at table, to utter useless views, or, may be, impertinent pleasantries,—*il faut pleurer sur les ruines de Jérusalem.*"

The President invited discussion on Mr. Woodward's paper, which he considered interesting and instructive, as well as amusing.

Mr. Tavernor Perry remarked that no reference had been made to the landlords of this country, and particularly to those of London. One of the difficulties London had to contend with was that the great landlords,—such as the Crown, the Dukes of Bedford and Westminster, and the Marquis of Salisbury,—had an opportunity of taking advantage of those who had created a valuable property, by refusing leases, or by granting them on such terms as to prevent the improvement of the metropolis, and any alteration of existing frontages.

Mr. Robert Walker said that while thanking Mr. Woodward for what he had done, he must, however, dissent from a great deal of what had been put forward. It should be remembered that in a city like London, which had risen up by a series of gradual growths,—a city which has been the home of liberty in regard to its buildings, as well as its social polity,—there must have been in its history a large amount of latitude displayed in the matter of building. In the present day there was a great deal of experiment in everything, but when the large mass of the population was suffering heavily in pocket, it was not a time for what might be termed architectural or building experimental legislation. Mr. Woodward had dealt severely with the Metropolitan Board of Works. It was a body made up from the various vestries of London, and had only certain powers under sundry Acts of Parliament. These powers might probably be extended in the future, and the Board be rendered more useful than at present. At the same time, Mr. Woodward was wrong in his reference to the state of Lissongrove, as a great deal of misrepresentation had been used in connexion with the matter. According to the local government of London, the sanitary officials of the parishes were the supreme authorities in each district on sanitary questions, while the Metropolitan Board had no authority whatever, except in regard to the sewers. It was therefore manifestly unfair to be so severe on the Board when they were not deserving of censure. As to the last Act of Parliament, it compelled larger areas to be given at the backs of houses erected on building ground in the suburbs. He differed with Mr. Woodward as to the Act being of little use, as it had been of the greatest possible advantage to the whole metropolis. It should be borne in mind that in architectural matters two things must be kept in view which should guide them in carrying out works; the first was the question of finance, and, secondly, it was no use for the architect to try to outstrip public opinion. They might endeavour to educate the public, but they

should always remember they could only build as far as their clients would entrust them with the means.

Professor Kerr proposed a vote of thanks to Mr. Woodward, whose paper, though sweeping in its character, was, he considered, one calculated to do a great deal of good. In these days there were so many things to attend to that the public mind could not be directed to any matter, even of considerable importance, without a good deal of that force which soon degenerated into exaggeration. He considered that Mr. Woodward was too hard upon the Metropolitan Board of Works. He (Professor Kerr) did not hold a brief for the Board, but it seemed to him that it had done the public good service. It should be borne in mind that the Metropolitan Board was not an imperial bureau; it was entirely a local and parochial institution, bound to keep itself within strictly parochial limits. Parliament seemed to have forgotten that London was not merely a city which was occupied by its own inhabitants, but the imperial capital. Therefore, Mr. Woodward was quite right in suggesting that sooner or later there must be a Minister of Public Works in this country, for the purpose of governing and controlling the administration of buildings in the metropolis as national property.* It was true that they were not encouraged, in their aspirations in that direction, by what had taken place in what was at present the substitute for such a ministry; but if the public,—as might be the case in course of time,—were a little better educated up to their duties, as regards the artistic and administrative regulation of London building, a better class of men would arise to hold office as members of the Government, with reference to that particular question. They would remember what Mr. Ayrton said with regard to his appointment as First Commissioner. He said that when the proposal was made to him that he should take office in the Government then being formed, Lord Palmerston as good as indicated that, as he knew absolutely nothing of building, that was the precise reason why he should be appointed to the office. This country had been, and probably would for a long time, be governed, not exactly by the country gentlemen, but by an educated class of men not immediately connected with business, and there was a good reason why it should be so. Out of that class it was easy to imagine that men might arise quite competent to administer artistic and scientific matters in regard to the building of London. If a Minister of Public Works were appointed, with some such staff as Mr. Woodward had suggested,—and that was a mere matter of detail,—the Metropolitan Board, or whatever authority might take its place, might do its work with perfect efficiency. At present what could the Board do? If it were to deal with artistic matters, not only would it be laughed at, but a disturbance would be created in every London vestry. At present there was no authority which could govern on behalf of the public, and the Institute might seriously consider whether some proposal might not be made,—as suggested by Mr. Edis on the last occasion,—in the interest of architecture, both artistic and scientific, and in the direction of the appointment of a high-class public officer.

Mr. William Westgarth seconded the motion, mentioning that he had been invited as a visitor to hear the paper. He referred to what he had done last year at the Society of Arts, in instituting prizes for the best papers on the reconstruction of Central London, and for the rehousing of the poorest classes. Mr. Woodward, he might say, sent in one of the best competitive essays, and secured one of the largest prizes. His (Mr. Westgarth's) idea was that, by means of the unearned increment, which he preferred to call the "natural increment," added to the increase of value due to improvements, the expenses of the whole reconstruction would be recouped, securing the fee-simple at a fair value for a sufficient number of years. His principle for reconstructing London was simply a business project, which should be self-remunerative. The reconstruction of central London seemed impossible on account of the immense values; that of Lombard-street alone, for expropriation purposes, being put as high as one hundred millions sterling. He had not given up his project, but the plan he now had in view was a very much reduced one. It would consist in taking some of the worst parts of central London, such as Houndsditch, at a fair value, carrying out the plan of reconstruction by a company with adequate capital, and securing a certain term of years for the natural increment of value.

Mr. E. C. Robins, as one of the judges for the Society of Arts in connexion with Mr. Westgarth's prizes, considered the present paper deserving of all praise. The twenty-six papers then sent in formed very interesting and suggestive reading, though some of the ideas were rather crude.

Mr. Forster Hayward suggested that Mr. Woodward should give some sort of description of his plan, which he saw on the walls.

Mr. Hebb remarked that Mr. Woodward seemed to think the Metropolitan Board was answerable for the way in which Northumberland-avenue had been laid out. As a matter of fact, the street, as originally proposed, was more advantageously planned with regard to surroundings, and more particularly the monument, but it was altered at the last minute by the Committee of the House of Commons; therefore any shortcomings with regard to the laying out of the street should not be attributed to the Board, but to the Committee, who thought themselves more competent to deal with it. As to the frontage on the Embankment, the Board had no power to lay down particular lines. That power was vested in the hands of the Superintending Architect, as statutory officer, and could only be exercised when a building was being commenced, or when some complaint was made with regard to a building which might be commenced.* The only power which the Superintending Architect possessed was that of determining the existing line of buildings in any particular block of thoroughfare. In the case of the Embankment there would not be a sufficient number of buildings to constitute a general line of frontage. With regard to Gray's Inn-road, the plan of Mr. Isaacs showed a much larger area than that which was included in the Parliamentary plan. It would no doubt have been desirable that an opening leading up to St. Alban's Church should have been laid out, but it should be borne in mind that the Metropolitan Board was answerable to its constituents, and had to make the best of the sites laid bare by improvements. The public desired economy in most matters, and if improvements were to be carried out from an Imperial point of view, they would have to be paid for.

Mr. Arthur Cates was very much surprised that Mr. Hebb should have put the functions of the Metropolitan Board at so low a standard. Its operations certainly should be conducted with economy, but the controlling organisation of this great metropolis should not be behind those of almost every small town of England and Europe. The great improvements effected in London had done much for the well-being of the people, and had attracted trade and population to it. Unfortunately the Board had occupied an unhappy position. It was spoken of as a "glorified vestry," created for the express purpose of carrying out the main drainage of the metropolis. Severe as Mr. Woodward's criticisms had been, he might have expressed some little commiseration for the position in which the Board had been placed. It was supposed to represent London, while in reality it represented the vestries, and that was the whole key to Mr. Hebb's observations. It was a misfortune for London that it should be so governed. If some such authority as had been indicated by Professor Kerr had exercised an influence over the general design, the mistakes which had been made would not have occurred, but, unhappily, a Committee of the House of Commons with a private Bill was the only authority for controlling the action of the Board. Then, again, the Board had, no doubt, been very much constrained by the idea which existed in Parliament that when a Bill was passed for the formation of a street, only those properties necessary for its formation should be taken. Hence arose the want of depth, and the ragged ends of miserable buildings overlooking narrow plots which were themselves useless. As Mr. Perry had mentioned the Crown, he would like to refer to what the Crown had done for the improvement of London. It had out of its revenues done more for London than London, apart from the City, had done for itself. Some fifty years ago the Crown was found to have a considerable amount of property between Oxford-street and Piccadilly, and some to the north of Oxford-street. John Nash, in conjunction with the Prince Regent, laid out a scheme for the utilisation of this, and formed Regent's Park, Regent-street, the Quadrant, and Pall Mall East. The whole of these improvements were executed from the revenues of the Crown, as a wise landlord improving its property and expending a large portion of its capital in the acquisition of other properties to carry out the improvement. If the Crown had not done this, what would have been the condition of that part of London at the present day? Mr. Perry had also referred to the Duke of Westminster. It was no part of his (Mr. Cates's) functions to defend the Duke, or any other landlord, but he would like to draw attention to the magnificent improvement, carried out at the cost of the Duke, at the south end of Grosvenor-place. This had been done in a manner worthy the imitation of the Metropolitan or any other Board. Another point for consideration was the relation between the State and the Metropolis. It had been said that London must be dealt with differently to any other town in England, because it was the Imperial Metropolis. Unfortunately since the constitution of the Metropolitan Board of Works there had been a great deal of hostility between it and the State with regard to improvements. The State did not hesitate to erect a large building in a great thoroughfare, saying that it was the business of the Metropolitan Board to improve the thoroughfare or widen the street. A much wiser system was followed in Paris. Before Hausmann's great works were carried out, certain improvements in connexion with buildings were being carried on by the Municipality. These were adopted by the State, which derived the greatest benefit from them. He believed that a contribution of two-thirds of the net cost was made from the State to the City, and as the improvements became more remote the contribution diminished, until they ceased altogether when the State derived no advantage. In the matter of the extension of the Mall to Charing-cross, Mr. Woodward would not suggest that the entire cost of opening up the Mall should be borne by the State. He hoped the Institute would spare no exertions to secure this great improvement, which would do more for the adornment of London than any other work in that portion of the town, and that they would be able to impress on the public, the State, and the Metropolitan Board of Works, the necessity for considerations of the highest standard, more elevated, and more advantageous for the inhabitants, than those which Mr. Hebb had indicated as at present governing the operations of the Board.

The President said that Mr. Street, in the only paper he had given them, advocated very strongly the appointment of a Minister of Public Works, to control the public buildings of the metropolis. A great deal was said at that time as to the enormous difficulties and dangers attending such an office, and doubtless much could be said on both sides; but a Ministry such as was then described would be a great public benefit, if it were properly supported. As to Sion College, if they were to be confined to a straight line on such a great thoroughfare, it would be a misfortune. A break, such as was shown at Sion College, might be made of great architectural effect. None could be more jealous of open spaces than he was, but a little picturesqueness of broken outline was valuable in a long frontage.

The vote of thanks was then put, and was carried by acclamation.

Mr. Woodward, in replying, said he had no desire to sweep away everything in regard to the Metropolitan Board of Works. His plan would form the subject of a paper at the Surveyors' Institution later on. Mr. Hebb had spoken of economy, but the way in which the Board laid out their building sites insured quite the reverse. As to St. Alban's Church, it was now too late to remedy what had been done, and the opportunity for having a little open place planted with trees there, had been lost for ever.

The President then adjourned the meeting to the 14th proximo, when Mr. William White, F.S.A., will read a paper entitled "A Week's Tour at Wisby, Sweden."

* We need hardly observe that this suggestion has been made over and over again in the *Builder* for years back.—Ed.

* Mr. Hebb might have added that the Institute of Architects themselves were invested with a certain power in the approval (or at least the disapproval) of designs for the site referred to.—Ed.

GREEK VASE PAINTINGS.

Miss Jane E. Harrison is giving a course of six lectures, at the lecture theatre of the South Kensington Museum, on the Mythology of the Iliad in connexion with Greek Vase Paintings. In the first lecture, after some preliminary remarks on the shape, sizes, and *provenance* of vases, Miss Harrison warned her audience at the outset against the too common error of looking at these vase-paintings as mere illustrations, and the great interest of the course lies in the method of showing the parallel but absolutely independent development of myths in literature and in art. The myth of the "Judgment of Paris" was the subject of the first lecture. Special attention was drawn to a point which Miss Harrison is making prominent all through the lectures, namely, the necessity, in any scientific study of vases, of finding out the original *type* of the vase painting, by eliminating all unnecessary adjuncts, and observing how, when the type is arrived at, it originates often from some subject of every-day life, which being found to lend itself suitably to the expression of a particular legend was henceforward adopted for that purpose. A group of three figures, wrapped in one cloak, moving in procession, and headed by a fourth figure, from a vase in Signor Castellani's collection, was shown by Miss Harrison to be the forerunner of the three goddesses marshalled by Hermes to the judgment of Paris. In a series of very successful and copious illustrations, given by means of the oxy-hydrogen light, the lecturer showed how this simple conception of the three goddesses and Hermes had gradually received the addition of Paris, of love-gods, &c., till at last, in a vase from the Hermitage in St. Petersburg, the presentation of the myth receives its finishing touch by the presence of Themis, and Eris, and father Zeus himself. For this legend of Paris wax paintings are specially valuable, since neither the poem of the Cypria, which, with Aphrodite for its hero, was specially concerned with it, nor any of the tragedies which took it for its subject have come down to us. Following out this same method of analysis of the types, in her second lecture, Miss Harrison examined in detail the vases which represent the Rape of Helen, and showed that the original type was that of a warrior forcibly carrying off a maiden, his hand upon her wrist. This conception, it is interesting to notice, was utilised not only in the legend of Helen, but also in similar scenes, *e.g.*, a representation of Agamemnon leading off Briseis, in another of Poluxena being led to sacrifice on the tomb of Achilles. Miss Harrison, in her third lecture, after touching on the legend of Iphigeneia, of which we have but one vase-representation, dealt at length with those vases which throw light on the parentage and youth of Achilles, in order that, when she treads the real ground of the Iliad, the character of its great hero may be the more perfectly understood. The great scene of the wrestling of Peleus and Thetis, which it is easy to strip of the later accessory figures of Nereids, Nereus, and other sea divinities, and to reduce to its original elements of a man wrestling with a woman, was amply illustrated by vases, both of the archaic black-figured and later red-figured period, and the famous François vase from Florence, with its splendid marriage-feast, showed that the stormy wooing had had a peaceful ending at last. A charming vase from the British Museum illustrated the confiding of the child Achilles by his father to the old Centaur Chiron to be educated along with other young heroes.

Miss Harrison will continue to lecture on Wednesdays till December 9th, when she will close her subject with the myth of the destruction of Troy. An account of the three last lectures will appear in the *Builder* of that week. The course is being largely attended. Among the audience are the Greek Minister, M. Gennadius, Mr. C. T. Newton, C.B., Mr. Burne Jones, A.R.A., Mr. S. M. Thompson, and other distinguished Hellenic scholars and artists. After defraying the expenses connected with the lectures, Miss Harrison will generously devote the proceeds to the building fund for the proposed British School of Archæology at Athens.

Bartestree.—A new wing, containing refectory, community-room, and nuns' cells, is about to be added to the Convent of Our Lady of Charity and Refuge, Bartestree, Hereford. The architects are Messrs. Pugin & Pugin.

COMPETITIONS.

New Presbyterian Church, Belfast. — The managers of Linenhall-street Presbyterian Church having decided on erecting a new place of worship, recently invited competitive designs for the buildings. From those sent in, the design submitted by Mr. John B. Wilson, of Bath-street, Glasgow, was awarded the premium, and the committee have now instructed him to proceed with the work at once. The new church, which will occupy a fine site in University-road, will accommodate over 1,100 sitters, and has besides a school hall for 600 persons and lesser hall for 250, with other necessary buildings. The style is Early French Gothic, with simple and severe detail, and the principal feature will be a massive tower, about 140 ft. in height. It is proposed to have the buildings completed within next year.

Ornamental Lodge, Shrewsbury.—The Shrewsbury Horticultural Society, whose annual shows are held in the "Quarry Grounds," or public park belonging to the town, having decided to present the Corporation with a new Entrance Lodge to be erected adjoining the Park Gates, advertised for plans in the local and other journals. In response, they received thirty-three designs from various parts of the country, including several from London. The designs were sent in under mottoes: the one selected for execution, viz., "Straight Tip," being by Mr. G. B. Rawcliffe, of Burnley. The design is in the half-timbered style, with Ruabon brick walls and tiled roofs, and is estimated to cost 500*l*.

Birkenhead Abattoirs Competition.—Eleven sets of plans have been sent in for this competition. Nothing has been decided as yet.

"*Old Edinburgh Buildings.*"—Six competitors sent in designs for this building for the International Exhibition of Industry, Science, and Art, to be held at Edinburgh next year, and the design of Mr. Sidney Mitchell, of Edinburgh, has been selected. We hope this will prove as attractive a feature as the Old London street at South Kensington.

Illustrations.

LONDON AND WESTMINSTER BANK.

SOUTH KENSINGTON BRANCH.

The building stands at the south-west corner of Brompton-square, having a frontage of 55 ft. to the square, and of 65 ft. to Brompton-road. It was designed to accommodate the bank and strong-rooms on the ground-floor and basement, the bank entrance-door being at the south-east angle of the site; manager's residence, with entrance from Brompton-square; and, in the upper part, chiefly fronting Brompton-road, a separate residence, with entrance at the western extremity of the site.

The whole has been substantially erected with Portland stone to both frontages. The floors throughout are fireproof on Dennett & Inglis's principle. Messrs. Easton & Anderson fitted the hydraulic lift from the bank to the strong-rooms.

The building was erected by Mr. J. T. Chappell from the designs, and under the superintendence of Mr. F. W. Porter, architect. The carving and sculpture are by Mr. Kelsey.

ST. DYFRIG'S CHURCH, CARDIFF.

The accompanying view of a design for a new church at Cardiff represents the architect's idea of a suitable edifice for the place. In consequence of the disapproval of those interested in the work, it has, however, been resolved to abandon the Renaissance type, and to substitute a Gothic design. A new design has been prepared therefore by the architect, and the necessary funds are being raised for the erection of the building. The church is to be erected upon a site near the Great Western Railway station. The architect is Mr. J. D. Sedding.

TOWN HALL, FRANECKER, HOLLAND.

We give a view of this little-known building in the present number. It dates from about 1590. The position of the spire, if so it can be called, rising from behind the two stepped gables at the angle of the building, is very effective.

HARBOUR GATE AT HOORN, HOLLAND.

The left-hand view of this picturesque gate-house shows the view of the building as approached from the water; the other the side towards the town. It dates from 1532, except in regard to the gable and lantern on the town side, which were added in 1651.

DUNBLANE CATHEDRAL.

On the banks of the river Allan, about five miles north-west from Stirling, lies the village of Dunblane, holding still, by courtesy, the title of a cathedral city. The name is derived from the patron saint of the Church of St. Blane, of Irish descent.

Originally there appears to have been erected here a Norman cathedral, of which only the lower portion of the tower is now left. Probably it was founded in the time of David I., but the historical notes of this structure are fragmentary, and leave its history in great measure matter of conjecture.

Certain it is, however, that in its early days the Bishopric of Dunblane passed through evil times, and at one time remained vacant for more than a century.

Fordun records the death of a famous preacher of the order of St. Dominic,—Clement, Bishop of Dunblane,—in 1256:—"A man great in word and deed before God and man, who, finding his cathedral roofless, desolate, and no better served than a country chapel, raised it up a distinguished sanctuary, endowed it with possessions, and extended to it the services of prebends and canons."

The nave and aisles are roofless, but the choir has been restored and is now used as the parish church. The nave has no transepts and the choir has no aisles, although on the north side of the choir a building is attached, supposed to be a chapter-house, which is entered from the choir.

The nave and aisles possess the chief interest for the architect, affording as they do a beautiful specimen of Early Pointed Gothic, of good proportions, fine moulded work, and almost devoid of carving. The nave consists of eight bays, and the triforium and clearstory are on one level with a passage between. The spaces between the piers diminish from 12 ft. 3 in. in the first bay at the west end to 10 ft. 3 in. in the eighth bay, by which piece of architectural trickery (for it is no better) an appearance of greater length is obtained when viewed from the west entrance.

The west gable is undoubtedly the most interesting feature in the building. It has a double window in three lights, with a slender mullion in each. A passage runs between the windows, from which the higher level of the triforium passage is reached by an angle stair. The outer window has plain splayed mullions and arches, and the inner one has moulded shafts and caps and finely-moulded arches.

The sill of this window being only slightly higher than the springing of the nave arcade, a graceful effect is thus produced with the long slender mullions.

The small window in the top of the gable has long since received its due from the pen of Mr. Ruskin.

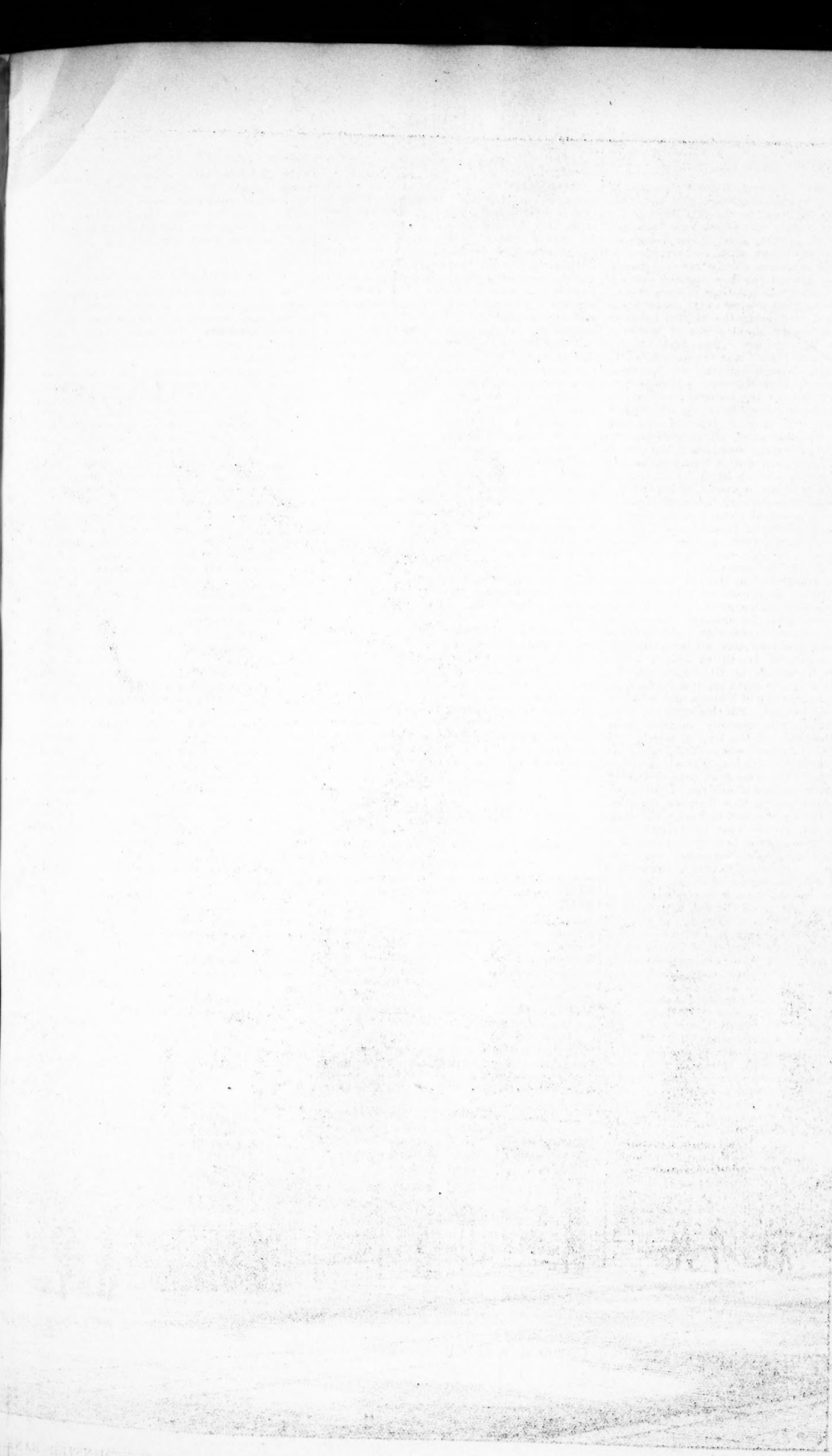
It will be seen that the lower portion of the tower is Norman. The two upper stages are of Early Gothic, while the finish of the top stage is baronial, of sixteenth-century character. It is also to be noted that this tower does not stand square with the rest of the building. Some conjecture that the axis of the original Norman cathedral did not lie due east and west, and that this error was rectified so far as the later structure was concerned.

The prebends' stalls in the choir are worthy of notice, being richly carved in dark oak, Late Gothic in style, and one of the very few specimens of Scottish ecclesiastical woodwork.

The cathedral, from its fine situation on the river bank, with a steep and sudden slope to the water's edge, must form a tempting subject to the artist, sufficiently proved also by the fact that Turner, on one of his northward journeys, halted here to note its dignified appearance.

From the architect and archæologist alike Dunblane Cathedral is well deserving of careful study.

Halifax.—Mr. Richard Horsfall, of the firm of Messrs. Horsfall & Williams, architects and surveyors, Halifax, has been elected mayor of that borough.

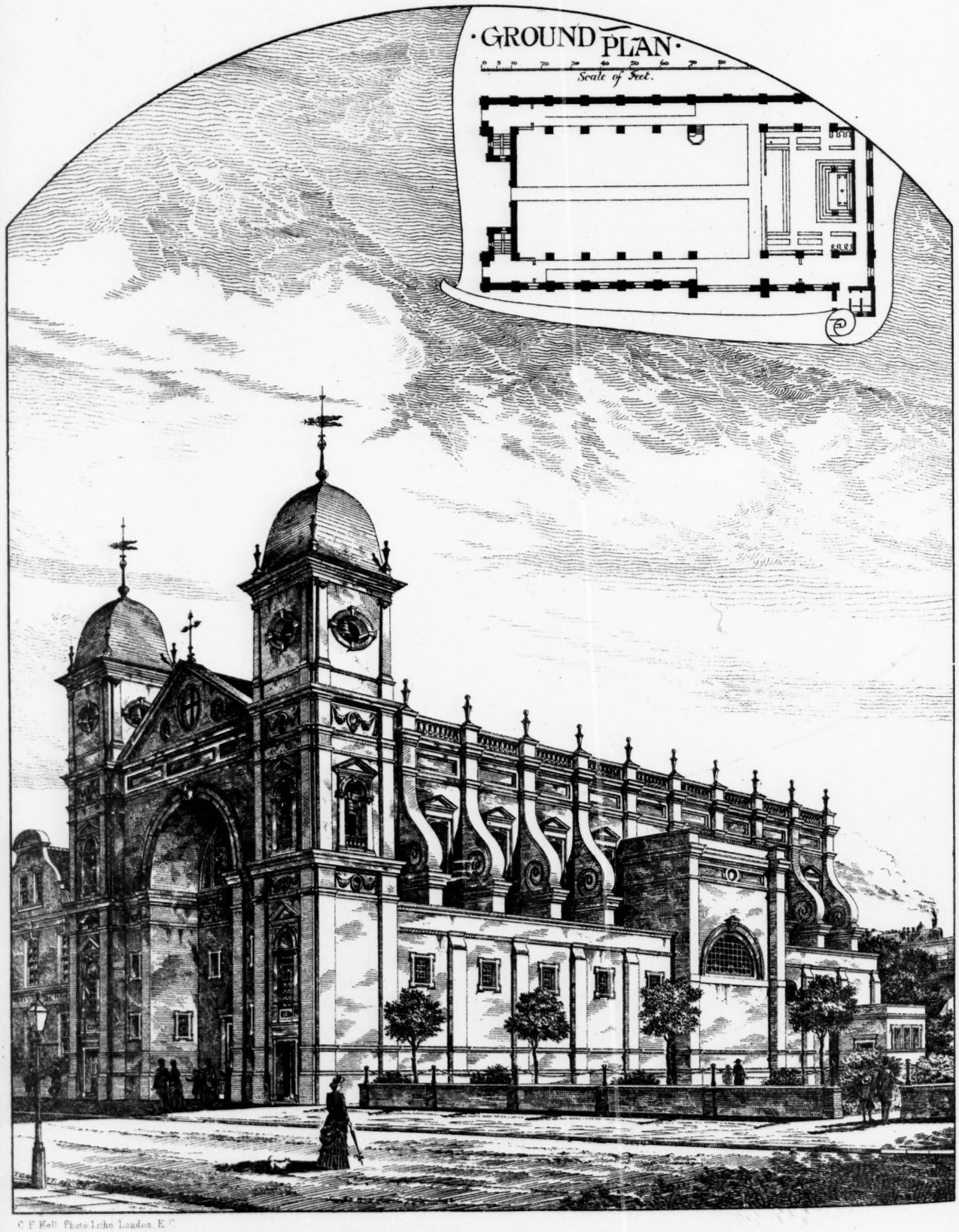


Wyman & Sons, Photo-Litho.

THE LONDON AND WESTMINSTER BANK, KINSING

KENSINGTON BRANCH.—Mr. Fredk. W. Porter, Architect.

G.Queen St. London, W.C.



C. F. Kell Photo-Litho London, E.C.

DESIGN FOR ST. DYFRIG'S CHURCH, CARDIFF. MR. J. D. SEDDING, ARCHITECT.

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DESIGN FOR ST. DYFRIG'S CHURCH, CARDIFF. MR. J. D. SEDDING, ARCHITECT.

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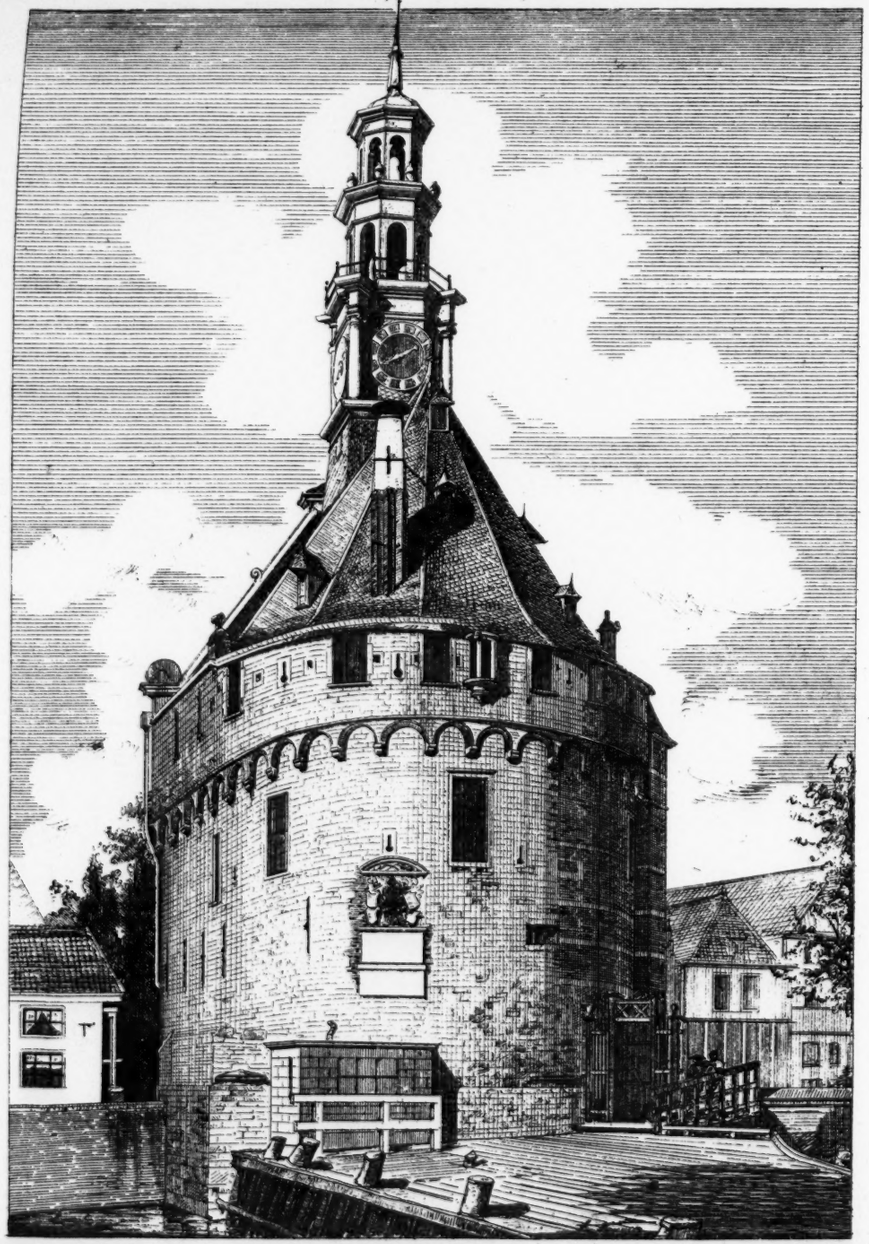
TOWN HALL, FRANECKER, HOLLAND.



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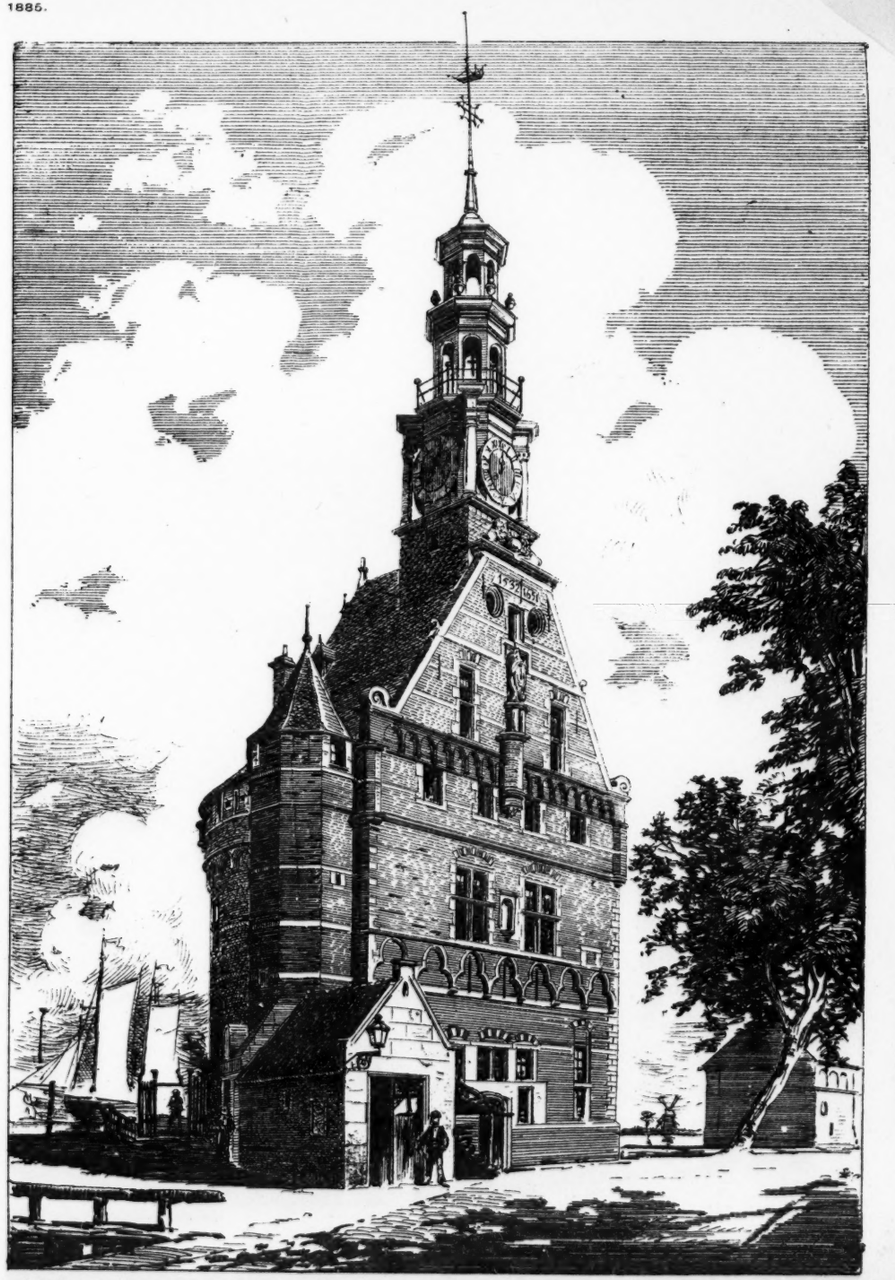
THE HARBOUR GATE, HOORN, HOLLAND.—(OUTSIDE.)



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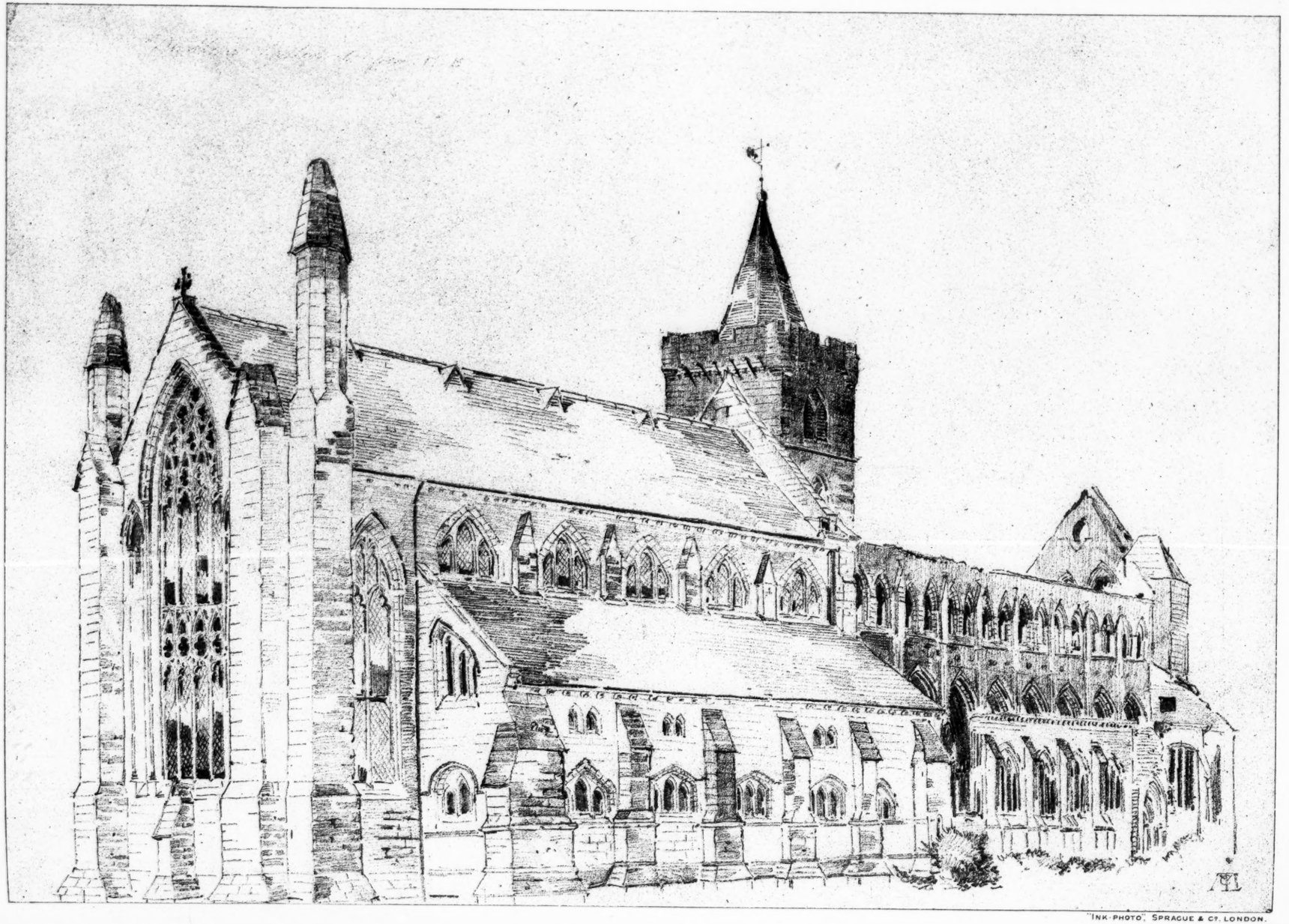
THE HARBOUR GATE, HOORN, HOLLAND.—(INSIDE.)

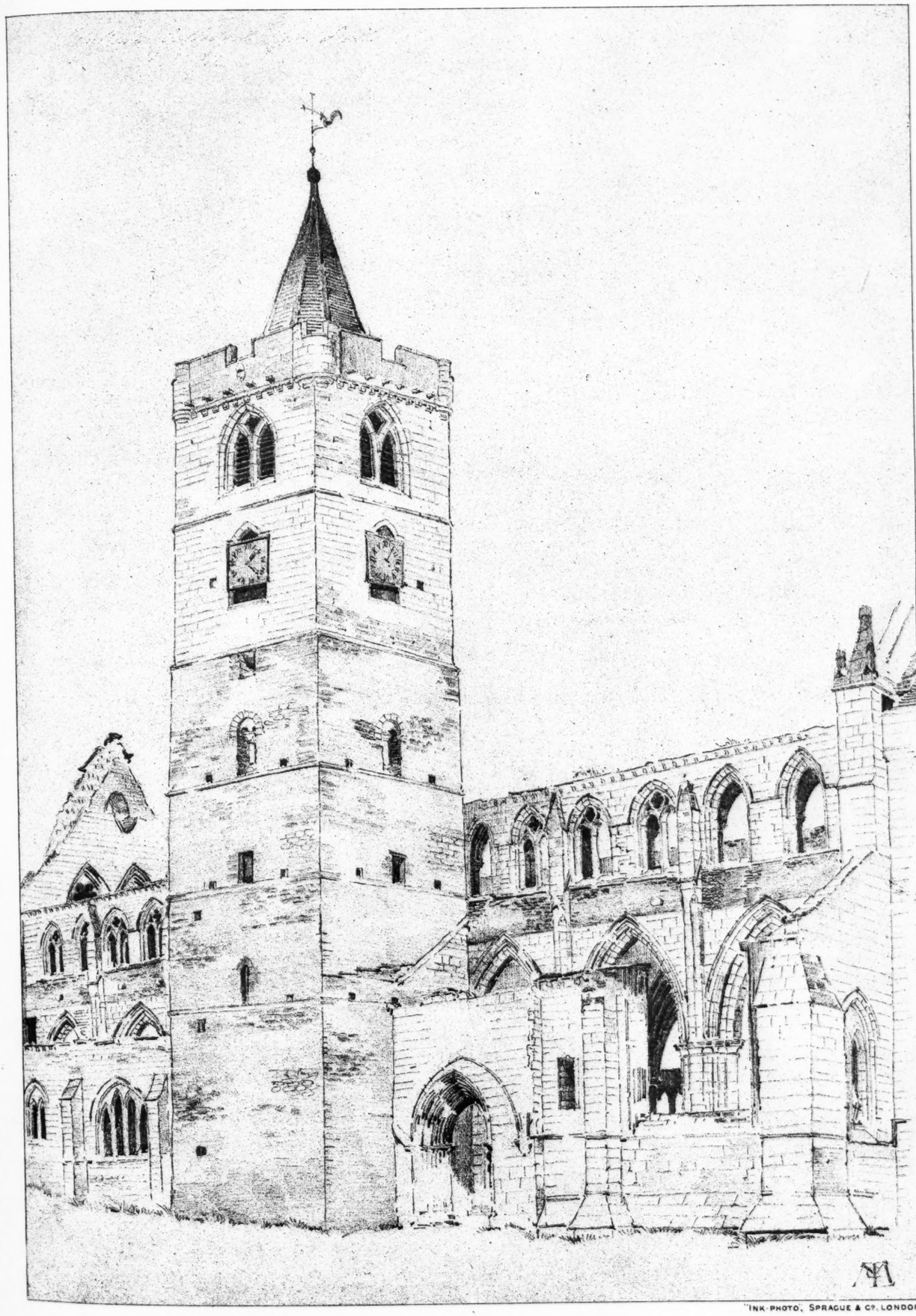


"INK-PHOTO," SPRAGUE & Cº. LONDON.

PUGIN TRAVELLING STUDENTSHIP, 1885.
MEDAL OF MERIT.

DUNBLANE CATHEDRAL.

DRAWN BY MR. T. MCLAREN.



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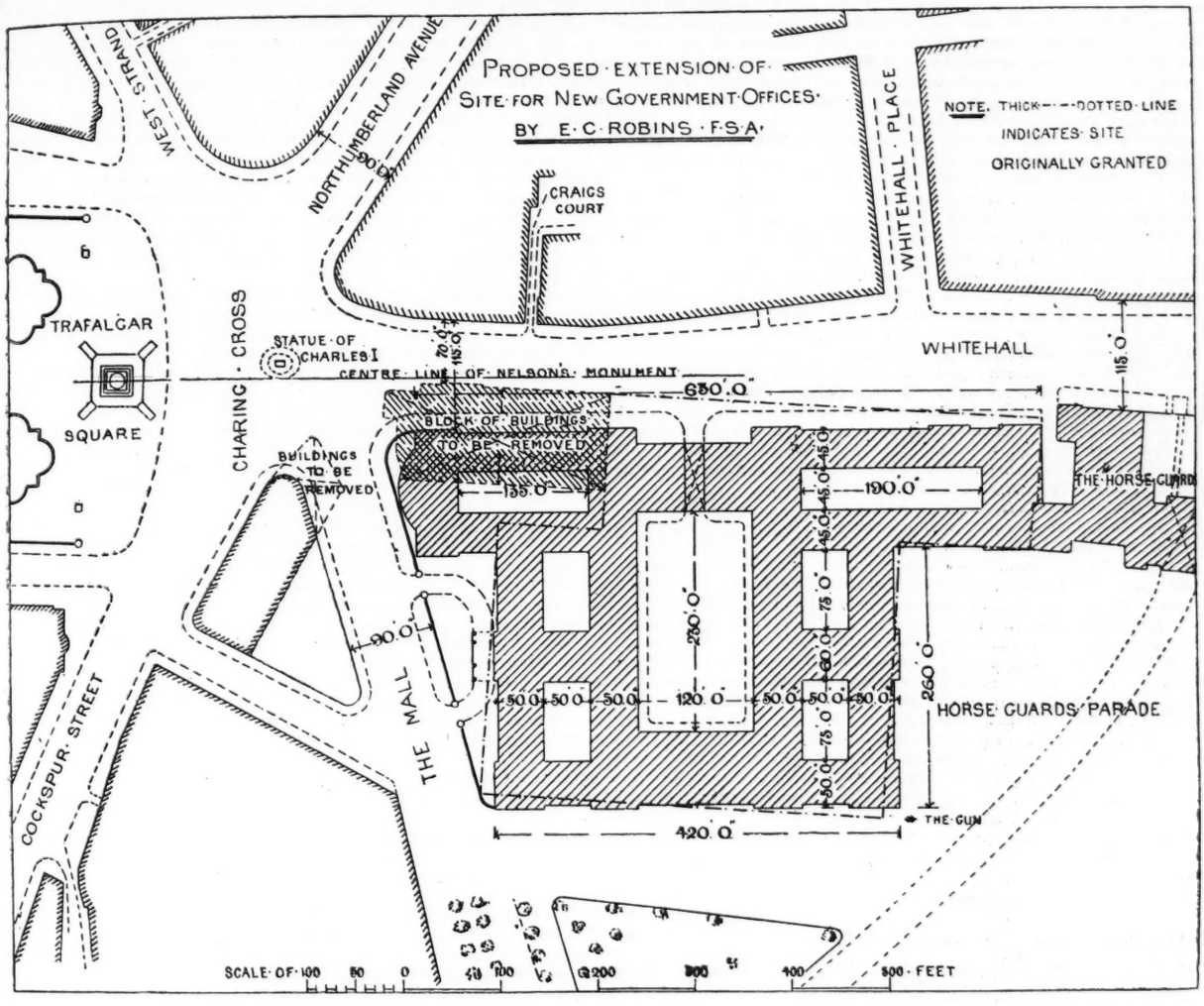

PROPOSED EXTENSION OF THE SITE FOR THE NEW GOVERNMENT OFFICES.

SIR,—I beg to submit a scheme for improving the approaches and extending the site of the new Government Offices. There is no great novelty in the following suggestions, you having, over and over again, very forcibly drawn attention to the subject in your valuable journal, but they seem to have been overlooked.

Having moved the resolution which was carried at the Royal Institute of British Architects at its opening meeting on the 2nd inst., and was published in the *Builder* for Nov. 7 [p. 659, *ante*], it seems appropriate that I should indicate the direction in which I personally think improvement may be made, and the extent to which I am anxious that the Council of the Institute should exercise its influence to overcome the impending evil, viz., the crowding together of a greater number of offices upon the selected site than is compatible with hygienic laws.

The appointed architects are no more responsible than the judges for the fact that the site is now proved to be much too limited. Moreover, the official decision in favour of this particular site and its special limitations was settled long before the competition, and, therefore, before it had been conclusively proved by the designs sent in that, without unduly raising the buildings and contracting the internal courts from which light and air are obtained, the site was quite inadequate.

If any doubt on the point existed, it was set at rest by the model, which made it clear to the simplest understanding that something should be done to extend the area to be devoted to the imposing range of buildings contemplated.

The necessity for a larger area having been demonstrated by the requirements of the building itself, æsthetic considerations may also be entertained, and perhaps it may be considered open to all to make such suggestions as may lead to a fuller discussion of the whole question, —that is to say, not only the building itself, but its surroundings also.

With this object I have prepared the accompanying plan to illustrate my views, and to show how the thing may be done on sound economical principles, and at the same time achieve a long-desired improvement, viz., the extension of the Mall of St. James's Park into Charing-cross, and the entire disengagement of the new public buildings from abutting structures of a meaner character, which now threaten to obscure the most important view.

To the accomplishment of this end it will be necessary to remove Drummond's Bank and the intervening buildings, and to extend the Whitehall façade to the Bank corner; at the same time, to set back the main front so as to widen the street at this, its narrowest part (about 70 ft.), to something like its width opposite the Horse Guards, viz., 115 ft.; and so that looking from Parliament-street Nelson's Column shall come in the centre of the widened roadway. In the same way, coming along West Strand, Buckingham Palace may be visible at the west end of the Mall, if it is continued into Charing-cross of a sufficient width, by the removal of the old houses south of Stanford's premises.

The result of these arrangements, as shown on the plan, is that the central court of the new buildings might be 230 ft. long by 120 ft. wide, and the remaining courts might be double their present width. Furthermore, the area of the land originally given upon which to plan the buildings was about 176,000 superficial feet, while the area herein proposed to be taken (exclusive of what is thrown into the roadway) is about 211,000 superficial feet. The portion of the original site area which was covered by buildings in Messrs. Leeming's first design (no plan having appeared of the amended design) was about 135,000 superficial feet; that is, the whole site except 41,000 superficial feet. The area occupied by buildings in the proposed plan will not be much in excess of that previously occupied, but there will be about 75,000 superficial feet given to courts and areas, besides the improvement of the approaches by the continuation of the Mall and the widening of Whitehall.

Those who have wandered over the Continent from Belgium to Vienna will not have failed to observe the care with which the municipal authorities plan their public buildings with an eye to their national representative character, having regard not only to their internal palatial design, but to their general environment also. It is grievous to see so grand an opportunity as the present thrown away for the sake of a few thousands, which it would be far less economical to keep than to spend, when so large an outlay in any case is necessarily involved.

EDWARD C. ROBINS.

PUBLIC WORKS AT TOTTENHAM.

WITH a view of meeting the growing requirements of the rapidly-developing parish of Tottenham, the Local Board are now spending large sums of money in the execution of permanent works. Operations which attract a considerable amount of attention amongst sanitary authorities are those in connexion with the treatment of the sewage of the extensive district within the jurisdiction of the Tottenham Board. It may be interesting to state that the approximate population (which has more than doubled within the last ten years) is now over 60,000; and it is obvious that any method designed for dealing with the sewage of a parish of 20,000 or 30,000 inhabitants would be inadequate to supply the want created by an addition of a hundred per cent. The Tottenham Board have been compelled to extend their works from time to time, and have lately been forced into special action by the attitude assumed towards them by the Lea Conservancy and the late Home Secretary. Mr. De Pape, the Board's engineer, was instructed to devise means for satisfying complaints preferred under the Lea Conservancy Act, 31 and 32 Vict. cap. 32 (Tottenham has a special saving clause, allowing it to discharge its sewage into the river, after treating it by the best known practicable means for deodorisation and purification), and he presented a comprehensive scheme, involving an outlay of something over 20,000*l*. While no member of the Board

suggested that the adoption of the method proposed would not achieve the end desired, a section considered that, having regard to the extent of the proposed expenditure, it would be well to have independent testimony on the point. It was accordingly resolved to call in Sir John Hawkshaw, Son, & Hayter, and the report of that eminent firm having confirmed every detail of Mr. De Pape's scheme (which subsequently met with the entire approval of Mr. Arnold Taylor, who held an official inquiry as representative of the Local Government Board), the Local Board determined to have the first section of the new works put into operation. Tenders were invited, and that of Messrs. W. Brass & Co. (for 15,000*l.*) was accepted. The work is now fairly in hand. The Board have constructed important intercepting sewers, on the advice of their engineer; and Mr. Arnold Taylor has held a public inquiry in respect to the application of the Board for permission to borrow about 10,000*l.* to construct a larger sewer than that now in operation, through Lordship-lane to Wood-green. This has been devised by Mr. De Pape to take the high level and other drainage of the locality, including that of the Noel Park Estate, which at present consists of more than 2,000 houses. Mr. Arnold Taylor expressed full approval of the scheme, and the loan will be sanctioned. The Board have also expended large sums upon works of water supply, and have just accepted a tender for sinking a well 12 ft. in diameter, down to the chalk, and boring 450 ft., at one of their pumping stations. Under the contract this work has to be completed within thirteen months. The Board have likewise spent over 24,000*l.* on private roads, and have determined to have many others made up as early possible; and the Board intend promoting in the ensuing session of Parliament a Bill to confer upon the Board further powers with regard to streets, buildings, sewers, sewage works, infectious diseases, and other sanitary matters within their district.

HARBOUR WORKS IN SCOTLAND.

Eyemouth.—On the 22nd ult. the memorial stone of a new harbour was laid at Eyemouth. According to the *Glasgow Herald*, the pier of the old harbour was built in 1747, and it was extended and improved, and a new pier added, in 1769–73, after a design by Smeaton. The greatly-increased size of the fishing-boats now used, combined with the development of trade, have rendered harbour-extension imperative; and though a scheme for this has been mooted for several years, it was only about a year and a half ago that it took practical form. A loan of 25,000*l.* was then granted by the Government for the construction of a new low-water harbour, which is now being formed in the bed of the river Eye, after plans by Messrs. Thomas Meik & Sons, C.E., Edinburgh. The contractor is Mr. George Lawson, Glasgow, and the resident engineer is Mr. William Kidd. The new harbour is 2½ acres in extent, and when completed the harbour will be 4¼ acres, or about three times the present area, with a depth of 18 ft. at high water of spring tides, or 4 ft. more than the existing harbour. The quay-walls are of concrete, 20 ft. in height throughout, and along the whole of the quays arrangements can be made for the discharge of fish direct from the boats to the railway trucks. Already a sum of 14,500*l.* has been expended in the construction of the new basin, which is 1,000 ft. in length; and the other 10,500*l.* will be applied to the improvement of the old basin and the formation of a deep-water channel to the sea, which will be 60 ft. in width, and of the same depth as the new basin.

Dumbarton.—The twin-screw patent hopper-dredger *Leven*, constructed by W. Simons & Co., Renfrew, for the Dumbarton Harbour Board, successfully underwent a series of official trials at Dumbarton the other day. This vessel was ordered in November last to effect important improvements in the Leven, after considerable inquiries as to the best type of dredger adapted for that purpose. The following particulars of the vessel are of interest:—Length on deck, 191 ft.; breadth moulded, 38 ft. 6 in.; depth moulded, 15 ft. The hoppers are placed near the centre of the vessel, and have capacity for 800 tons of its own dredgings. The vessel is built principally of steel, and is sub-divided into ten water-tight compartments. The bucket-ladder is fixed on the builders' patent traversing carriage, which enables the buckets to dredge in advance of the bow, and can be afterwards brought back and housed on deck, so as not to impede the vessel's sailing qualities. This arrangement will be found of great advantage, as the vessel, instead of lying idle until the tide makes, as is often the case at other ports, will be able to excavate into banks ahead of itself, and so practically cut its own flotation. It can also dredge to a depth of 32 ft. below the light water-line. A separate hoisting engine is fitted up in the forward end of the vessel for controlling the bucket-ladder. Powerful crab winches are placed at the bow and stern for working the vessel; they are of a special design, and are particularly well adapted for the work required; they are triple-geared, and have three separate barrels fitted so that each mooring-chain can be worked independently, also warping ends for use at quays, &c. The buckets are made of steel, and have a capacity of 17 cubic feet, and are driven at the rate of twenty per minute, and when working in sand raise the enormous quantity of 800 tons per hour.

ON CIRCULAR HOSPITAL WARDS.

SIR,—It is gratifying to find that Mr. John Brown, by his letter published in your last issue [p. 700], does not contest my statement that 57,392*l.* per 1,000 patients would be a fair estimate of the increased annual charges for nursing and maintenance when the wards of a hospital are designed to contain twenty only instead of thirty beds. "This expense," he says, "will have to be incurred so long as wards for twenty are preferred to those for thirty beds."

I also understand him to admit that the cost of the buildings would also, under these circumstances, be much increased.

This really is my main contention, and I at once admit that if thirty-two beds could be placed in circular wards of 60 ft. diameter (such as those at Burnley Hospital) the difference in the cost between the two systems (although still considerably in favour of the parallelogram plan) would, probably, have been insufficient to induce me to read my paper at Leicester. But I am not aware that any serious proposition for putting thirty beds in a ward has ever been made by the advocates of the circular system. Twenty is the number adopted at the Antwerp Hospital, the wards of which are 61 ft. 6 in. diameter. Twenty is the number of beds at the Burnley Hospital wards, 60 ft. diameter; and the learned Professor Marshall, who was the first to introduce the system into England and who to the present time remains its stanch supporter, takes for his illustration a ward 61 ft. diameter, containing eighteen beds. I can only, therefore, assume that the supporters of the system would scout Mr. Brown's suggestion for placing thirty-two beds in a circular ward, unless the diameter were increased considerably, and then the cost of the buildings would again become abnormally great.

Mr. Gordon Smith, another supporter of the system, shows in the pamphlet referred to by Mr. Brown, that a ward on the circular system, to contain thirty beds, should be 84 ft. diameter, and at this rate the 32-bedded ward suggested by Mr. Brown should be 89 ft. diameter.

This proposition seems to have arisen from a misconception of what I stated in my paper; for he says, in introducing the subject:—"Mr. Snell's experience from his four large parish infirmaries and from the Moabit Hospital, Berlin, as given in his paper, satisfied him that 6 ft. of bed-space is sufficient," and he argues from this that I ought to be satisfied with 6 ft. of bed-space in circular wards.

Now, really, I cannot see what there is in my paper to lead Mr. Brown, or any one else, to a supposition that I consider 6-ft. bed-space to be sufficient in an ordinary hospital ward.

It is true I have built workhouse infirmaries with beds this distance apart, but it is because they are workhouse infirmaries, and had I designed these buildings with 8 ft. wall-space, and with 1,200 or 1,300 cubic feet per patient, the Local Government Board would have refused to allow the buildings to be erected, because the cases treated in these hospitals are not considered to be of so severe a character as those in general hospitals.

It should be remembered that I commenced my paper by saying that my arguments applied only to the wards of general hospitals, and not to hospitals (like workhouse hospitals) erected for special purposes. And before proceeding further, I would call attention to the fact that I have, from the commencement of this discussion, been most careful not to commit myself to any expression of opinion as to what ought to be the accommodation or the wall, superficial, or cubic space of hospital wards, whether circular or oblong. I have based all arguments, so far as regards the question generally, upon the opinions of eminent experts, and so far as regards the circular system upon the writings and works of its known advocates.

Mr. Brown says that my large circular ward, 65 ft. diameter, arranged for twenty-two beds, is not one that would be suggested by any advocate of the circular system, and that "Professor Marshall's ward for twenty-two beds is 4 ft. 6 in. less in diameter." Will Mr. Brown kindly refer again to Professor Marshall's pamphlet, and he will find that this gentleman takes for his example a circular-ward, 61 ft. diameter, containing eighteen beds, and although he says twenty-two beds might be put into this space, he, in preference, illustrates the ward to contain only eighteen beds? How can Mr. Brown reconcile this with his statement that a ward 65 ft. diameter, arranged for twenty-two beds, is not one that would be suggested by any advocate of the circular-ward system? Professor Marshall, in the same pamphlet, publishes a suggestion for a ward 84 ft. diameter to contain thirty beds. What, then, is there so unreasonable in my suggestion for a 65-ft. ward containing twenty-two beds? Surely my jump from 61 ft. to 65 ft. 6 in. (4 ft. 6 in. only) in diameter for an increase of four beds is much less in proportion than the Professor's jump of 23 ft. diameter for an increase of twelve beds.

Mr. Brown's objection to what I said with regard to ventilation is, I think, untenable, for one of the arguments of the advocates of the circular system is that the central shaft affords a much better opportunity of getting rid of the foul air of the ward, and this central shaft is at Antwerp made use of in this way. It is quite true that the foul gases need not be carried across the length of the ward into this central shaft, and that they might be carried up in the side walls, as suggested by Mr. Brown, but this has not been done, to my knowledge, at any circular building yet erected, and if the drawings supplied to me by the architects of the Burnley Hospital are correct, Mr. Brown is mistaken in supposing that it is to be done at that building. It is most distinctly shown that the outlet for foul gases will be in the ceiling next the central walls of the staircase. Mr. Brown will also pardon my correcting his assertion that the foul-air outlet-shafts are in the outside walls of the Antwerp Hospital. It is true, as he says, that "the outlets are there below the patients' heads," in the outside walls, but these outlets are connected with trunks which run below the floor and across the whole length of the ward, into the central ventilating-shaft.

All these discussions, however, upon minor matters draw away attention from the main points of my argument, and with your permission I will shortly reiterate them.

First, The highest authorities upon hospital construction allow that thirty to thirty-two are not too many patients to have under the charge of one head, or one night-nurse; but if these patients were placed in wards situated at any distance apart additional nurses would be required.

The rectangular form admits of thirty or more beds being placed in a ward; the circular form does not. The largest circular ward yet erected contains only twenty beds, and to attempt to put many more than this number into them either reduces the bed-space below what is considered by experts to be right, or increases the diameter of the ward to inordinate dimensions.

This being the case, I showed that the cost of erecting and working a circular-warded hospital entailed an enormous extra cost, and no argument has yet been adduced to show that I am wrong in this conclusion.

If it can be shown that all the eminent authorities whom I quoted are wrong in the opinions which formed the groundwork of my argument, then I can have no hesitation in admitting that argument to be invalid; but has this been done?

Mr. Brown and others get over this question by repeating almost word for word what I said in my paper would be their reply:—"We have nothing to do with the cost; what we desire is to erect that description of building, whatever it may be, which best adapts itself to the cure of the patients contained in it."

I admitted that, within reasonable limits, this view of the question was a right one; but the question is, "what is a reasonable limit?"

The building "best adapting itself to the cure of the patients," if designed without reference to the question of cost, would be one consisting of isolated wards, each containing one patient and having one nurse in constant attendance; but, if the question of economy were to be paramount, the wards should hold forty patients each.

The difficulty is to know where to draw the line. Miss Nightingale and the medical and architectural advisers of the Herbert, St. Thomas's, Leeds, Friedricksham (Berlin), Lariboisière, Bourges, St. Eloi, and many other famous hospitals, say twenty-eight to thirty-two beds is the most prudent unit to adopt. Inquiries made of the superintendents at the above institutions show that no difficulty whatever is experienced in nursing so many, and no other objection is urged against the system. On the other hand, many hospitals have been built during the last twenty-five years with wards varying in accommodation from fourteen to twenty patients, but the question naturally arises, Did the authorities under whom these buildings were erected have it brought under their notice how much more expensive the first cost and management would be if this smaller number were adopted? There is nothing to show that this was the case.

If it be true that hospital accommodation is lamentably short of what it should be in this country, then is it not serious to contemplate that 105,000*l.* per 1,000 patients is being wasted by indulgence in this wasteful system of building? Surely the time has come when some official inquiry should be made into the question, rather than that so grave an extravagance should be permitted to continue.

This, however, though all-important, is not the only detail of hospital construction affected by the circular system of building wards. We have to ask ourselves whether buildings designed upon this principle are better adapted "to the cure of the patients contained in the wards," because of its circular shape. I have ventured to say not, and that unless Nature's laws be contravened, air will not as freely pass through these wards from one side to another, when the windows are 60 ft. apart, as it would if those windows (as in rectangular wards) were 24 ft. apart. Mr. Brown says, in answer to this, "We never want wind blowing through our wards; but for ventilation we desire the ingress of a gentle current of air. However the wind blows, we have it sweeping round the circle, and, by its aspirating effect, gently drawing the air from the ward."

If Mr. Brown is correct in this view, then all the teachings of hospital experts who have advocated narrow wards and cross ventilation have been delusive. But how, I would ask, is the wind to sweep round this circle when, as a matter of fact, two buildings (the nurses' and sanitary offices) project outwards from it and obstruct its passage? Aspiration, whatever its value, could only occur when the wind was blowing from one or two quarters, and it is quite clear that at any time it must be blowing very hard indeed to produce any sensible aspirative effect.

I have asked in vain that the supporters of the circular system will demonstrate how, in defiance of all mathematical rules, they can maintain their assertions that, when the sun is shining or the wind blowing against the straight wall of a parallelogram-shaped wall less air and sun would penetrate through its window openings than would penetrate an equal number of window openings of the same size contained in the wall of a circular ward. I asked also to be shown that the constriction of the feet of the beds consequent upon their radiation towards the centre of the circle is not a distinct disadvantage, where, as in the case of a medical school, the greatest space for students should be given round and about the patients. I have not had, and did not expect to have, any reply to these important questions.

H. Saxon Snell, F.R.I.B.A.

DUNFERMLINE HIGH SCHOOL.

Sir,—In your article on the Dunfermline new High School in last week's issue [p. 697], you state that the ventilation extractors were supplied by Mr. Stevens, Leeds. I shall be glad if you will kindly correct this. The ventilators are Stevens's exhaust, but have been supplied by myself.

James Edward Ellison.

CONTRACTOR *versus* ENGINEER.

Sir,—In answer to an advertisement, a contractor sends in a tender on a form supplied by the engineer of a local board, for a storage reservoir. On the form of tender it states the work is to be carried out according to plans and specifications prepared by the engineer; and the contractor finds, after his tender has been accepted, that the specification requires him to keep the work in repair for six months after certified completion, but that the work is not to be considered complete until the reservoir is *perfectly watertight*.

The contractor maintains that if he carries out the work in accordance with the specification it is all that should be expected of him, and that the matter of the reservoir being watertight should rest with the engineer.

The contractor refuses to sign the contract unless the clause relating to the reservoir being watertight is struck out; and if any of your subscribers could give any information as to the legality of the tender, I should be greatly obliged.

A Subscriber.

PROVINCIAL NEWS.

Stockport.—The Stockport Infirmary has been re-opened, after undergoing alterations and renovations at a cost of upwards of 6,000*l.* The Infirmary was originally constructed on the corridor principle, all the rooms being entered direct from the corridors, accommodation being found for 30 patients, allowing 1,200 cubic feet of space for each. Recently the committee, acting on the advice of the architects (Messrs. Pennington & Bridgen, of Manchester) and the medical staff, determined to entirely re-construct all the wards, to pull down the back part of the hospital and rebuild it on the pavilion principle, and to devote the front portion to purely administrative purposes, for which it was well adapted. The three two-story pavilions, which have now been constructed, afford accommodation for fifty-two patients, allowing a space of 1,200 cubic feet to each, together with sculleries, &c. The convalescent day-rooms, day-nurseries, and servants' rooms, and operating theatre are on the first floor fronting Wellington-road South, the night nurses being provided for in the second story over the portico. The out-patients' dispensary, the rooms for the resident matron, the board-room, and the secretary's office are on the ground-floor, and the kitchen offices, one story in height, are centrally placed in the rear of the main building. The laundry and mortuary, each one story in height, are completely isolated from the hospital. Messrs. T. and W. Meadows, of Stockport, were entrusted with the principal portion of the alterations, Mr. R. Hayward being the sub-contractor for the plumbers' work, and Messrs. Hamnett for the painting and decorating. Mr. J. Todd acted as clerk of works.

Carlisle.—Extensive alterations at Messrs. Carr & Co.'s biscuit manufactory, Caldergate, under the personal superintendence of Mr. T. Taylor Scott, architect, of Bank-street, have been completed. The changes effected are numerous and varied, great attention having been devoted to the ventilation and fresh air supply, which is a *sine quâ non* in a manufactory of this description where the operatives work in a very high temperature. The large machine-room, in which nearly all the biscuits are made, has been doubled in size, and has also added to its previous complement two new patent travelling ovens of superior arrangement and construction to those hitherto erected. The ovens are 40 ft. long, with a solid external appearance, but internally they form a network of machinery, flues, and furnaces. The large new packing-room forms an elbow to the old one, and is well lighted and ventilated. Adjoining the packing-room and bridging the railway, has been constructed with iron a very complete lavatory for the girls. Messrs. C. & J. Armstrong, builders; Cairns & Co., ironfounders; H. & R. Court, joiners; W. & R. M. Hill, plumbers, painters, and glaziers; and C. J. Nanson, slater, have carried out the various works.

Wolverhampton.—The foundation-stone of the new drill-hall for the Third Volunteer Battalion of the South Staffordshire Regiment was laid on the 23rd ult. The building consists of three frontages to Whitmore-street, Stafford-street, and Thornley-street. The large drill-hall, which will be 184 ft. long and 76 ft. wide, will be provided with a stage at the one end and a gallery at the other. In the basement will be an apparatus for heating the whole of the building by hot-water pipes. Messrs. Horsman & Co. are the builders. The total cost of the building will be about 8,000*l.* The designs for the building have been prepared by Mr. Daniel Arkell, architect, of Temple-row West, Birmingham.

Bath.—According to the *Bath Chronicle*, no inconsiderable amount of street widening and improvement has been done by the Surveying Committee within the last few years. And the close of the present municipal year witnesses the approach towards completion of two or three very desirable alterations in the busiest thoroughfares of the city. First in importance is the Monmouth-street improvement. The greatly-increased width of roadway cannot but be welcome to those engaged in vehicular traffic. A particularly awkward corner for pedestrians will have been removed when the Westgate-street improvement is finished. While important thoroughfares are looked after, less important ones should not be forgotten. For example, could not something be done for the top of Gay's-hill?

Bradford.—On the 28th ult. the Mayor of Bradford formally opened a new wing which has been erected in extension of the Bradford Infirmary. The new wing will provide accommodation for seventy or eighty additional patients. The building, which has been erected after designs prepared by Messrs. Milnes & France, is three stories high, including a light and airy basement, which is used for porters' day and night rooms, boiler-room, and the like, and which is connected with the basement of the old building by an open corridor on both sides. The ground-floor contains a private entrance for the staff in Lumb-lane, a staircase leading to the upper and lower floors, four rooms originally intended for use by the head nurses, and five small wards intended for two beds each. The first floor contains one large ward, 122 ft. long and 30 ft. wide, intended for thirty beds. The second floor is occupied by a single ward of the same size, which is set apart entirely for thirty-four children. The clear height of the wards is about 14 ft. 6 in. On each floor, in a detached wing, are the bath-room, sinks, and water-closets. Adjoining the wards are a nurses' room and scullery. In the latter are lifts for food, coals, and the like. The walls are built hollow and lined with brick, but externally they are built with the millstone grit of the district. The floors are of cement concrete, supported on iron beams, and the ceiling of the top room is fire-proofed in the same way. Above the cement the floors are covered with pitch pine, and the floors in all the wards are polished. The warming and ventilating of the wards are combined to a great extent, for the external air is admitted at the rear of each fireplace, there warmed and thrown into the rooms in great volume. No hot water, steam, or other similar contrivance is used, and the air in the wards is kept pleasantly warm by the open fires. Additional inlets for fresh air when required are provided in the shape of vertical inlet tubes, besides which the windows will be largely used as a means of ventilation. Two separate outlet flues of large size are provided for each of the large wards, and these are heated by gas to secure a current in the right direction. The cost of the new wing is about 12,000*l.*, exclusive of furniture and collateral alterations in the old premises. The various works have been executed by the following firms:—Masons' work, Messrs. Hinchliffe & Small, of Bradford; joiner's work, Mr. James Deacon, of Shipley; slater's work, Mr. Albert Hill; plasterer's work, Mr. W. H. Hargreaves; plumbers and glaziers' work, Messrs. T. Nunwick & Co.; ironwork, Messrs. Taylor & Parsons; and painter's work, Messrs. L. Morrell & Son, all of Bradford. The tiles for floors and walls have been supplied by Messrs. Maw & Co., and Messrs. Woolliscroft & Co., and the building throughout is warmed by means of Shorland's patent open fire warm-air generating Manchester grates. The gasfittings are by Messrs. Freeman & Collier. The lifts,

which will be worked by hydraulic cylinders at a pressure of over 700 lb. per square inch, are provided by Messrs. Tannett, Walker, & Co., of Leeds.

Loughborough.—An important step towards the acquisition of a supplementary water-supply for Loughborough has just been taken by the Local Board in acquiring from Mr. de Lisle the right of the Blackbrook water. Some time ago, when the Leicester Corporation approached Mr. de Lisle on the subject of the Blackbrook water, the Loughborough Board, in order to guard the interests of their district, took the precaution of acquiring a site adjoining the brook, about a mile below the old reservoir site, thus securing to themselves the right to take a supply of water from Blackbrook, and also securing themselves from interference by the Leicester Corporation at a point higher up the stream. The construction of works at the lower level would, however, have involved the necessity of pumping the water to the Loughborough reservoir, a more expensive process than by gravitation, as was intended in the original scheme, which contemplated the extraction of the water at a point on Mr. de Lisle's estate higher up the brook. Although the Local Board, acting on the advice of eminent counsel, felt themselves pretty safe against opposition, the advantages of the gravitation scheme over the pumping scheme were so manifest as to make it worth their while to purchase Mr. de Lisle's rights if the opportunity presented itself. Communications for this purpose were opened by the Chairman of the Board, Mr. George Hodson, C.E., F.S.I., with Mr. German, on behalf of Mr. de Lisle, and an arrangement has been entered into whereby the Board will acquire the necessary rights in the Blackbrook, together with sufficient land to develope the whole volume of water it is capable of yielding.

Cromer. — This favourite watering-place having now obtained a public supply of pure water has abandoned the use of shallow wells. The Local Board, being desirous of perfecting the sanitary condition of the town, has instructed Mr. J. C. Melliss, C.E., to report and advise as to the drainage and sewage disposal.

Books.

Quæstiones de Re Vestiaria Græcorum scripsit Joannes Boehlau Borussus. Weimar: Hermann Boehlau.

IT is always a matter of regret when, from some academic necessity, a book, the subject of which is essentially popular, has to appear in a tongue not understanded of the people. The book before us gives on the subject of Greek dress just such information as, we fancy, the laity would be glad to have. Anxieties about the correct shape of chiton and himation, of diploïs and chlamys, fall to many whose lot is unvexed by the intricacies of Greek syntax. We posed as Trojans in the "Tale of Troy," or, careless of precise period, we went "as Greeks" to the "Masque of Painters." We found the costume both cool and cheap. To go "as a Greek" is nearly as absurd as to go "as an Englishman"; Helen would have been vastly astonished had she inspected the wardrobe of Aspasia. All this Dr. Johann Boehlau sets before us, and that very simply, though unfortunately, in Latin. First he settles the terminology of the subject, clearing the mists that hang about diploïs, diploïdion, hemidiploïdion, chiton, chitonion, chitoniskos, and a host of other floating terms. Next he passes to chronology, and shows that for both chiton and himation there were successive forms, Doric, Ionic, Attic, in the main successive, in part, no doubt (for tradition lingers), contemporaneous. He gives us copious illustrations, mainly from vase paintings, and rightly so, for in vase paintings we have a straightforward realism, and an attention to detail which cannot be expected from the more idealistic method of sculpture. Should the fashion for masquerading as Greeks continue, we hope the book will circulate widely. If the Latin text repell, we can promise that the plates will attract. London loves a novelty, and if the masqueraders could be persuaded to appear in the quaint Doric costume of strictly 500 B.C., as figured by Dr. Hermann Boehlau, we are sure they would command attention.

The Popular Guide to Westminster Abbey. With Introductory Chapter by the DEAN. *Pall Mall Gazette* Office. London. 1885.

THIS is a reprint, we believe, of articles from the *Pall Mall Gazette*, and is chiefly valuable historically, as a sketch of the persons buried in the abbey, and the associations connected with them. The notice of the architecture is somewhat meagre, and the "illustrations" are very badly printed, and had better have been omitted altogether.

A Short Study in Gothic Architecture. With Illustrations. By S. T. H. PARKES. London: Winsor & Newton. 1885.

A SMALL book on Gothic architecture ought to be a very good one to justify itself in these days. The present work is an addition to the list of Messrs. Winsor & Newton's yellow shilling books on various branches of art, and we hardly see that it is in its place in such a series. The subject is too large to be treated in this form, unless the treatment were confined to a mere statement of the heads of the subject. As it is, Mr. Parkes attempts too much for his space, and philosophises,—a habit bad enough in large books on architecture; inexcusable in small ones. The statements contained in the book are correct, but they are not arranged in a very intelligent manner. The illustrations are hard and mechanical in style.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

10,105, Attachment for Builders' Squares. A. M. Clark.

The instrument is adapted for laying out rafters, stairs, &c., and consists of an ordinary square with a slotted bar, of L-shaped section, adjustable thereon. One end of the bar terminates in a jaw, and is clamped as desired by a set screw. A second jaw works in the slot, and is adjusted by a sliding stud; it is then clamped to the square by a set screw.

10,621, Walls, Attachment of Crestings and Advertisements. R. Worrall.

In some of the courses are laid bricks moulded with grooves, so that a bar of metal may be placed in the wall longitudinally. The bar is previously treated to prevent rusting, and may be surrounded with felt or other compressible material to allow expansion to take place. The bar is secured to the lower courses by tie-rods built into the wall. The highest course of the wall, instead of being the usual coping, is of grooved bricks, a bar being laid in them as described. Boards, &c., may be attached to the wall by bolts, which extend from the bars within the wall to the face, and when spiking is required along the wall, it may be affixed to the bar laid in the upper course.

12,736, Bricklayers' Pointing Tool. J. Blacka.

The face of the tool is grooved for moulding to any desired pattern, and the end is shaped so that true mitres can be made in that pattern.

14,304, Water-closet. E. Pearson.

The hopper-basin, valve-box, and overflow-pipe branch are moulded in one piece of glazed earthenware. The outlet-valve, which opens downwards, and is kept normally closed by a counter-weight, is fixed on a lever which is fulcrumed. The flushing-valve is worked from the lever by means of a link.

15,871, Water-closet. W. Withington.

The flushing-tank is made in the shape of a hopper, with the intention of increasing the pressure at the outlet and thus the velocity of discharge. The soil-pipe is closed by a sliding valve, which is raised by means of a lever attached to the same handle as the flushing chain. Thus the flushing and discharge-valves are opened simultaneously. A valve is attached to an air-vessel to cause it to close slowly.

12,901, Ornamenting Glass. J. Budd.

For imparting to sheets of glass the appearance of marble, malachite, onyx, or other stone, for use in the decoration of ceilings, &c., a tank is partially filled with a mixture of one part by measure of lime to two parts of water, and any ordinary pigments, mixed with oil and of the tints desired, are floated on the mixture. Any other mixture capable of floating the colours may be employed. The glass, prepared or not with gold size or other suitable drying material, is laid on the floating colours, which are thereby transferred to the glass. The veined or ornamented surface is then painted to form the ground, is coated with a mixture of shellac and plaster of Paris or other backing material, and when dried is ready for use.

NEW APPLICATIONS FOR PATENTS.

Nov. 6.—13,428, G. Kennedy, Apparatus for Coupling Ladders. — 13,448, R. & J. Mollon, Actuating the Tables of Planing Machines, &c.—13,464, H. Johnson, Latches for Doors and Gates.—13,477, W. Swire, Improvements in Washstands.

Nov. 7.—13,497, R. Hunter, Fixing Window Sashes.—13,504, Askester and Kelly, Plain or Embossed Wall Coverings, Panels, &c.—13,514, Heinrichs and Wildhagen, Boardings for Surfaces to be Plastered.—13,524, W. Foulis, Heating Houses or other Buildings.—13,526, W. and G. Barker, Open and Close Fire Grates and Stoves.—13,550, W. Lake, Apparatus for Opening or Closing Windows, Doors, &c.

Nov. 9.—13,591, J. Sutherland, Apparatus for Preventing the Entrance of Wind, Dust, and Rain under Doors, &c.—13,595, A. Brookes, Manufacture of Artificial Stones or Marbles.—13,598, P. Winn, Apparatus for Discharging Water from Flushing Tanks or Cisterns.—13,619, E. Craddock, Apparatus for Measuring Water, &c.

Nov. 10.—13,622, F. French, Fasteners for Window Sashes, &c.—13,638, T. Newey, Fasteners for Windows, Doors, &c.—13,645, A. Brookes, Improvements in Traps to Drains, &c.—13,662, A. Barber, Manufacture of Asphaltic Mastic.—13,666, 13,671, and 13,672, W. Alvord, Improvements in Knob Attachments.—13,675, F. Smith, Ventilating Rooms, &c.—13,692, C. Parsons, Combined Wood-sawing and Slicing Machines.—13,699, W. Keller, Manufacture of Cement or Mortar.

Nov. 11.—13,722, F. Fidler, Locks and Latches.—13,730, C. Knight, Jointing Pipes.—13,741, D. Baker, Ventilation Apparatus.—13,748, E. Horsley, Window Fasteners.—13,758, E. Horsley, Door and Window Fastener.—13,766, W. Lindsay, Fireproof Floors.—13,769, H. Meinecke, Water Meters.

Nov. 12.—13,775, J. Cochrane, jun., Smoke Disperser for curing Smoky and Defective Chimneys.—13,808, C. Gardner, Improvements in Paint Tins, &c.—13,821, W. White, Improvements in Locks or Latches.—13,837, C. Day, Improved Sash Fastening.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,110, H. Lake, Improvements in Pavements, Flags, and Slabs.—11,270, E. Killick, Manufacture of Cement.—11,271, E. Killick, Improvements in Kilns.—11,806, W. Timewell, Manufacture of Cement.—11,953, R. Anderson, Apparatus for Ascending Chimneys.—12,062, W. Yates, Window-sash Fasteners.—12,099, W. Simons, Sash-fastener and Lift combined.—12,125, E. Murray, Register for Room-to-Room Communicator.—12,250, E. White, Chimney-pots or Terminals.—12,251, W. McHaffie, Uptake Ventilators and Smoke Cowls.—12,339, H. Sloane, Chimney Cap.—12,393, J. Northwood, Improvements in Ventilators.—12,448, H. J. & W. Ward, Sash Fastener.—12,470, T. Murphy, Whitewash or Distemper Brush.—12,508, A. Kerr, Water-closet Cistern.—12,542, E. Ferrari, Improvements in Ladders.—12,801, S. Bamford, Stench Traps.—12,938, J. Adams, Water-closet Pans.—11,146, C. Wharton, Automatic Window-sash Fastener.—11,819, Sanderson & Moffitt, Boring Tools for Wood.—11,940, W. Petty, Opening the Doors of Public Buildings, &c., in case of alarm or panic.—11,949, J. Starling, Spindles for Knobs and other Handles.—11,995, Sanderson & Moffit, Fasteners and Openers for Fanlights, &c.—12,000, Vogt & Bernstein, Lamps for Removing Paint from Wood and Iron, also for Soldering and Brazing purposes.—12,737, E. Horsley, Window and Door Fasteners.—12,832, B. Skipworth, Self-acting Window Fastener.—13,098, J. Ebner, Parquet and other Floorings.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

16,068, B. Turner, Improvements in Door-springs.—363, A. Reddie, Improvements in Bakers' Ovens.—1,014, J. Callow, Stencil-plates for Graining, &c.—1,155, J. Boyle, Improvements in Urinals and Supply-cocks.—1,940, J. Easby, Automatically Closing the Aperture in Closet-seats.—7,543, Griffiths & Gibbs, Chimney-cowls and Ventilators.—14,892, J. Winfield and Others, Combination of an Oven and Boiler with Mantel Register-stoves.—15,997, McAdam & Jones, Balancing and Securing Sliding Window-sashes.—16,097, J. Saunders and Others, Sash-fasteners.—16,630, F. Trier, Apparatus for Dressing, Shaping, and Moulding Stone.—17,076, E. & J. Verity, Terminal for Preventing Down-draught and Inducing Up-draught for Chimneys, Ventilators, &c.—2,187, R. Evered, Manufacture of Bell-work Fittings.—5,166, J. King, Warming, Cooling, and Ventilating Buildings, &c.—11,025, H. Smith, Preventing the Rattling or Shaking of Window-sashes.

Brighton.—An anonymous donor, a lady, has caused to be inserted in Queen's square Congregational Church, Brighton, a stained-glass window, with the text, "The flower fadeth, the Word abideth," worked on a flowing scroll. The window bears the inscription, "In memory of Revd. Edwin Paxton Hood, Pastor of this Church 1862 to 1873. Died in Paris, June 11th, 1885." Messrs. Lavers, Barraud, & Westlake were the artists, and the work, together with the general restoration of the fabric, has been carried out under the direction of Mr. Arthur Loader, architect, Mr. J. T. Chappell being the contractor.

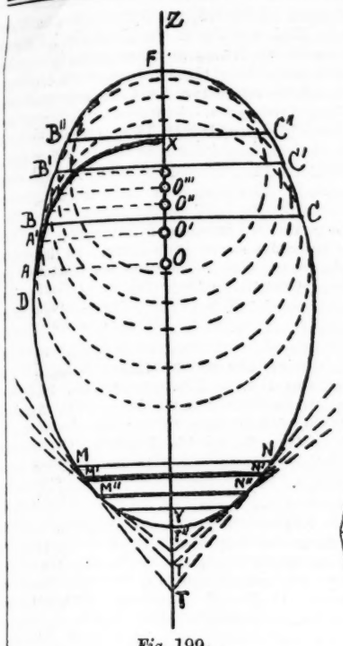

Fig. 199.

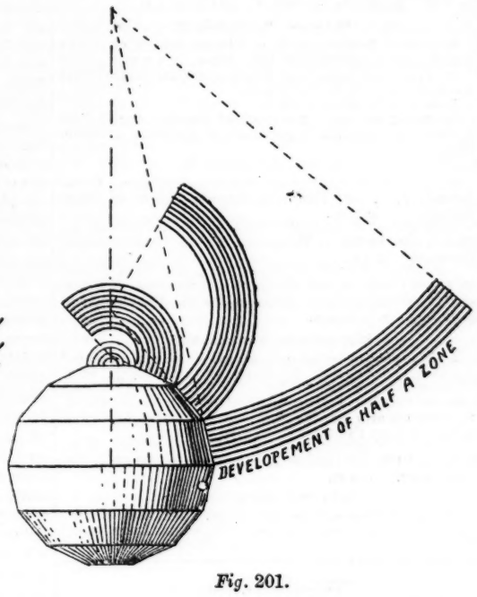

Fig. 201.

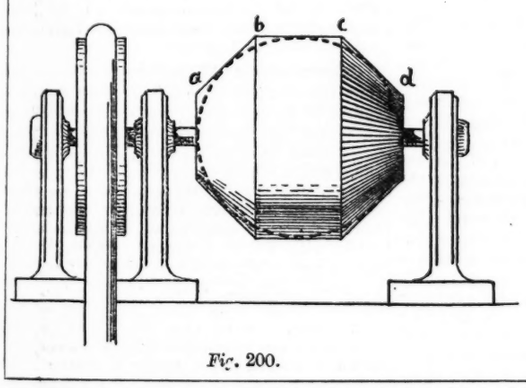

Fig. 200.

Fig. 202.

The Student's Column.

DESCRIPTIVE GEOMETRY.—Part II.

XXV.

Enveloping Surfaces.

We have, in article No. II. of the second part (vol. xlviii., p. 816), mentioned a class of surfaces called *enveloping surfaces*,—that is, surfaces formed by the successive intersections of the position of another surface, *called the enveloped surface*, moving through space varying in position, and even in shape according to some given law. The intersection of two successive positions of the enveloped surface (taken infinitely near to one another) is called the *characteristic* of the enveloping surface.

We have already considered in the preceding article on developable surfaces a special case of enveloping surfaces; that is, the surfaces formed by the *motion of a plane* through space, according to a given law; but now we shall consider enveloping surfaces in general,—a question the student will find of more practical importance than at first appears.

Let us imagine a moving sphere (fig. 199), the centre of which follows the vertical line T Z, and of which the radius varies in length in such a way that its extremity will always touch a curve A A^1 X. Then two neighbouring spheres, of centres O and O^1, infinitely close (the student should consider our drawing as a figure enlarged by an infinitely strong magnifying glass), will intersect one another along a horizontal circle, projected here on the line B C, and the neighbouring spheres, of centres O^1 and O^{11}, will intersect one another along a horizontal circle $B^1 C^1$, and so on with every other successive sphere. All these circles, B C, $B^1 C^1$, $B^{11} C^{11}$, ..., having their centres on the line T Z, and their planes perpendicular to that line, belong, therefore, to a surface of revolution of which T Z is the axis, and which will touch every one of the spheres; for the circles B C and $B^1 C^1$ belong to the surface of revolution, and also belong to the same sphere of centre O^1: so we can conclude that the zone (infinitely narrow) between the circles B C and $B^1 C^1$ is common to the enveloping surface and to the enveloped sphere.

In our figure, the meridian of the surface of revolution is formed by a succession of arcs, such as B B^1, $B^1 B^{11}$, ...; but as these arcs are infinitely small, the meridian is really a continuous line, the shape of which depends on the law which governs the variations of the radius of the sphere. For instance, if *the length of the radius is bound to remain always the same*, the enveloping surface of the moving sphere will be a *right cylinder*.

If the meridian D B F of the surface of revolution be given, then, when we conceive it as generated by an enveloped sphere, the sphere in motion will be bound to be tangent to the meridian curve.

Surfaces of revolution can also be considered as generated by a variable cone. Suppose that through the points M, M^1, M^{11} of the meridian F D Y we draw tangents M T, $M^1 T^1$, $M^{11} T^{11}$, and that these tangents are made to rotate with the meridian round the axis Y Z; it is evident that these tangents will engender right cones, which will touch the surface of revolution along parallels thereof M N, $M^1 N^1$, ..., &c. We can, therefore, say that *a surface of revolution is the enveloping surface of the positions taken by a variable cone of revolution, moving through space with its vertex always on the axis and its generator always tangent to the meridian of the surface of revolution.* In other words, the surface of revolution is considered as consisting of a series of conic zones.

Our readers will perhaps remember that, thanks to this consideration, we were able to delineate the shade of surfaces of revolution with the help of cones (see fig. 152, p. 308 *ante*). Thanks to this consideration also, the workman shapes a billiard-ball on a turning-lathe with the help of a straight-edged chisel. He first cuts out of the solid a few conic zones which envelope the sphere of the ball, as in fig. 200; then he binds these zones together by cutting down the arrises *a*, *b*, *c*, *d*, between them so as to form narrower conic zones, and by cutting again the new arrises formed, the turner gets his solid gradually cut down nearer and nearer to the shape of a spherical billiard-ball.

Instead of turning the sphere out of a solid by cutting out the conic zones, we might develop each zone, as in fig. 201, and cut it out of cardboard; then, by fitting the zones over one another and glueing their edges together, we should form a hollow body, which would be near the shape of a sphere.

It is a similar construction which was employed in the first practical example with which we introduced the science of descriptive geometry to our readers (see No. I., Feb. 7). The quadrant which formed the angle of the balcony of a hall was, of course, part of a surface of revolution, the generator of which was given by the section of the balcony; but in cutting out the boards which were to cover its surface, we considered these boards as forming conic zones, and were able thereby to develop them.

Tin-ware manufacturers fashion their wares as enveloping surfaces to the different positions of a plane. They have a cylindrical or conical anvil on which they bend the sheet of tin along a series of straight lines drawn before-hand thereon. The sheet of metal is, therefore, a moving plane, of which narrow strips form the general surface of the tin-ware.

Again, when a wood or stone carver copies a statue from a clay model, he first forms a body composed of planes only, which envelope the surface the figure will ultimately receive, and the surface of the statue is fashioned by cutting down the angles between these planes so as to get gradually to form an enveloping surface of ever smaller and smaller planes.

It is easy to conceive the exact position and direction of straight lines and planes, but it is next to impossible to copy exactly a curve right off. For this reason, Sir Charles Barry advised his pupils to draw all their mouldings by the means of straight lines (see fig. 202), and finish them off by slightly rounding off the angles; for by this mode of drawing one obtains what he called character.

Royal School of Mines.—Prof. Warington Smyth, F.R.S., in continuing his lectures in the theatre of the Geological Museum, Jermyn-street, spoke of the inconvenience attending the exaction of royalty where, as in this country, the mineral belongs to private proprietors, when mines are working at a loss, and contrasted it with the system which obtains in other countries where the clearance only is assessed, and not the whole bulk raised. Though the latter may encourage operations, especially in periods of distress, it is often attended with interference in the way of supervision, which Englishmen will not willingly tolerate. He subsequently entered upon the question of inequality in the character of a deposit, referring, in the case of stone, to the general disappointment felt with regard to that used for the Houses of Parliament, where the stone was admittedly from one of the best quarries in the country; but, in consequence of the lack of precaution to have its bed specially selected *in the quarry*, by a thoroughly experienced man, it has proved so marked a failure. Referring to the much-debated question of the origin of lodes, he preferred to credit Dr. Pryce, of Redruth, author of "Mineralogia Cornubiensis," and not the celebrated Werner, of Frieberg, to whom literature has long attributed it, with first having advanced the now generally accepted theory of their being originally fissures caused by internal movement of the earth, the filling up taking place subsequently. Perhaps the strongest proof which could be advanced in support of this explanation of the fact is the existence of cavities where crystallised or stalactitic formations are frequently to be found lining the sides. Referring to the oft-repeated idea of a resemblance between the mineral veins of the earth and the veins of the human body or the branches and twigs of a tree, he considered such a notion a very far-fetched one, as there was in reality no such resemblance; but instances had come before him where people so impressed spent much capital in the vain endeavour to so follow the small twigs, or veins, as they considered them, until they should ultimately arrive at the trunk, which he could assure them would be a very long time.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

Nov. 6.

By W. B. Hallett.

Carshalton—58, Avenue-villas, 84 years, ground-rent 10*l.*	£200

By G. & D. Field.

Commercial-road—Ground-rent of 5*l.*, reversion in 29 years	135

By Maddox & Son.

Clerkenwell—96, St. John-street, freehold	1,135

Nov. 10.

By Debenham, Tewson, & Co.

City of London—A freehold ground-rent of 300*l.* per annum, reversion in 93 years	7,500
48 and 49, Bread-street, 73 years, ground-rent 80*l.*	8,000
Camden Town—4, Wilmot-place, 59 years, ground-rent 5*l.*	360
Wood Green, Southgate-road—Two freehold houses and shops	2,500
Edmonton, Hertford-road—Houndsfield House, and 2a. 1r., freehold	890
Two freehold residences adjoining	1,350

By R. A. Notley.

Edgware-road—Improved ground-rents of 46*l.* 10s. per annum, 31 years	720
Kentish Town—Improved ground-rents of 27*l.* per annum, 53 years	540
Improved ground-rents at 16*l.* 1s. per annum, 50 years	350

By Harman Bros.

Islington—180, Barnsbury-road, 40 years, ground-rent 41*l.*	420
Northamptonshire, Watford—An enclosure of freehold land	130

By Masterman, Evans, & Co.

King's Cross—Ground-rents of 157*l.* per annum, term 56 years	3,005

Nov. 11.

By Hards & Jenkinson.

Jamaica—The sugar estate called Danks, and 3,616 acres	4,000
The sugar estate called Bog, and 5,097 acres	4,100
The sugar estate called Amity Hall, and 692 acres	6,500
Montserrat—The sugar estate called Streatham Estate, 365 acres	1,180
The sugar estate called Hermitage Estate, 929 acres	1,075

By D. J. Chattell.

The reversion to one-fifth share of 13,399*l.*, invested in Consols, &c., life aged 85	1,800
Paddington—29, Edbrooke-road, 77 years, ground-rent 8*l.*	500
67 and 73, Walterton-road, 77 years, ground-rent 20*l.*	1,150
50, Oakington-road, 77 years, ground-rent 7*l.*	980

By Fuller, Moon, & Fuller.

Upper Tooting—Norton Cottage, freehold	455
Lower Tooting, High-street—Freehold house and shop	820
A freehold house and shop	1,280
A plot of freehold land	1,480
Four plots of freehold land	145
Mitcham—Four copyhold cottages	320

Nov. 12.

By E. Stimson.

Canonbury—55, Compton-road, 59 years, no ground-rent	600
Rotherhithe—52 and 54, Plough-road, and a ground-rent of 4*l.* a year, term 62 years, ground-rent 10*l.* 10s.	520
Camberwell, 86, Picton-street, and 2 and 4, Cork-street, 15 years, ground-rent 16*l.* 16s.	235
Walworth—3 to 21 odd, Portland-street, 16 years, ground-rent 20*l.*	1,110

By Dowsett & Woods.

Lincoln's-Inn-Fields—4, 4a, and 5, Sheffield-street, and 13a and 14, Bear Yard, freehold	4,600
15, Bear Yard	600
6, Sheffield-street, freehold	625
Haverstock Hill—Freehold ground-rent, 14*l.*, reversion in 88 years	355
Improved ground-rents of 48*l.* 19s., term 65 years	825

By C. C. & T. Moore.

Stepney—17, 18, 19, 21, 22, and 23, Bedford-square, 13 years, ground-rent 24*l.* 16s. 6d.	545

By F. Hards.

Greenwich—80, Calvert-road, freehold	295
1 and 3, Calvert-road, freehold	575
1, Annandale-road	395
Vanbrugh Hill, a plot of freehold land	255

By Beadel & Co.

Brighton—14, Chichester-terrace, freehold	4,500
Fifty shares of 100*l.* each in the Law Life Assurance Society	5,490

Nov. 13.

By E. Turvey.

Streatham—75 to 81 odd, New Park-road, 1 to 6, Sulina-road, three cottages and stabling, 43 years, ground-rent 200*l.*	1,110
63 to 69 odd, Wellfield-road, 44 years, ground-rent 5*l.*	485

By E. Smith & Co.

Thurloe-square—Improved rental of 8*l.*, term 41 years	130

By J. Brown.

Limehouse—Freehold ground-rent of 7*l.* a year	155

By Baker & Sons.

Africa, Transvaal—Numerous freehold farms, containing 109,416 acres.	2,062

The Brick and Tile Gazette.—Some numbers of a publication under this title have been forwarded to us. On opening one of them, for July 15 of this year, the first thing we saw was our article on "Early Plasterers and Plastering" (*Builder*, May 31, 1884), reproduced word for word as an original article, without a syllable of acknowledgment. We do not know if the publication in question is still going on.

MEETINGS.

Saturday, November 21.

British Museum (Archaic Room).—Miss J. E. Harrison on "The Parthenon Marbles." (III.) 11 a.m.

Monday, November 23.

Surveyors' Institution.—Mr. Edward Smyth on "The Copyhold Enfranchisement Bill, 1884-5." 8 p.m.

St. Paul's Ecclesiological Society.—Annual Dinner, First Avenue Hotel, Holborn. 7 p.m.

Inventors' Institute.—8 p.m.

Leeds and Yorkshire Architectural Society.—Mr. Arthur J. Gale on "English Impressions of American Architecture."

Tuesday, November 24.

St. Paul's Ecclesiological Society.—The Rev. C. L. Acland, M.A., on "The most Remote Church of Great Britain." 7·30 p.m.

Anthropological Institute.—Five papers to be read, including one by Mr. J. Theodore Bent on "Insular Greek Costume." 8 p.m.

Institution of Civil Engineers.—(1) Mr. John Imray, M.A., on "High-Speed Motors." (2) Mr. Gisbert Kapp, on "Continuous-current Dynamo-Electric Machines, and their Engines." 8 p.m.

Wednesday, November 25.

Archæological Section of Birmingham and Midland Institute.—Mr. Cecil T. Davis on "Gleanings in a Gloucestershire Parish." 7 p.m.

South Kensington Museum (Lecture Theatre).—Miss J. E. Harrison on "The Mythology of the Iliad as illustrated by Greek Vase Paintings." (IV.) 5·15 p.m.

Liverpool Engineering Society.—A paper by Mr. D. A. Quiggan "On the Design and Construction of Steel and Iron Ships." 8 p.m.

Thursday, November 26.

Society of Antiquaries.—Mr. J. H. Middleton, F.S.A., on the "Newly-Discovered Saxon Church at Deerhurst." Two other papers will also be read. 8·30 p.m.

Miscellanea.

Liverpool Engineering Society.—The usual fortnightly meeting of this society was held on the 11th inst., at the Royal Institution, Colquitt-street, Mr. W. E. Mills (President) in the chair. A paper by Mr. Thomas Duncason, Assoc. M.Inst.C.E., entitled "Service Reservoirs," was read by the author. He first referred to the comparatively small reservoirs required for regulating variations in the consumption of water, and obviating the inconveniences from accidents, and showing that under varying circumstances the service reservoir may properly fulfil its functions with a capacity of from one to six days' supply. He then pointed out the desirability of covering service reservoirs, and proceeded to consider the subject under the heads of open and covered reservoirs. Open reservoirs, he stated, were usually constructed much on the same lines as storage reservoirs, with earthwork embankments, rendered watertight by clay puddle. Covered reservoirs were dealt with under the heads of,—(1) materials used to insure watertightness; (2) walls; (3) floors; (4) roofs. In referring to the question of materials used to insure watertightness, the author recommended clay-puddle for adoption when the foundation is on clay; Portland cement when it is on earth, gravel, or rock; and artificial asphalte when on rock. The principles on which the walls should be proportioned and the best formation of the floors were then dealt with. Referring to the construction of the roof and the methods of supporting it, the author pointed out the desirability of supporting it on brick, stone or concrete pillars and arches, instead of on columns and girders. In conclusion, the cost of reservoir construction was considered, and it was stated that, although this varied much for different localities and sizes, an average price for open service reservoirs would be about 10s. per 1,000 gallons capacity, and for covered serivce reservoirs, about 4*l.* 5s. per 1,000 gallons capacity.

City Markets for Fish, Fruit, and Vegetables.—The Markets Committee have unanimously determined to recommend the Corporation to adapt the Farringdon Fish Market to a fruit-market, abolishing the old fruit-market in Farringdon-street; and to erect a new fish-market on some vacant land at the western end of King-street, Smithfield. The deficit upon the Central Fish Market during the past year was 9,878*l.*, and the loss upon the Farringdon Fruit and Vegetable Market during the same time amounted to about 2,300*l.* It is estimated that the building of the new Fish (and other Provisions) Market will cost 25,000*l.* It is contemplated that these changes will reduce the present deficiency upon the markets in question to 400*l.*, and enable the Corporation to sell the site of old Farringdon Fruit Market for something like 130,000*l.*—*Citizen.*

Surveyorship to the Grocers' Company. Mr. H. C. Boyes, F.R.I.B.A., has been elected to this office.

Wages of Building Operatives in New South Wales.—From the Statistical Register of New South Wales we glean some interesting details respecting the average rates of wages of building operatives in that colony during the last few years. Stonemasons, it appears, received 11s. per day in 1876, after which, in 1877, the minimum declined to 10s., rising again in 1882 to 11s., at which point it has since remained. Stonemasons' labourers received 8s. in 1876. In 1877 the maximum rose to 10s., sinking to 8s. in the following year, and remaining the same ever since. In the wages of plasterers there has been an increase, the rates in 1884 being from 11s. to 14s. as against an average of 12s. in 1876. Plasterers' labourers receive from 7s. to 9s. as against 8s. in 1876. The wages of bricklayers have fluctuated somewhat during the same period, being 12s. in 1876, from 10s. to 12s. during 1877-1881, and from 12s. to 13s. during 1882-4. The wages of bricklayers' labourers have risen from 8s. in 1876, to from 8s. to 10s. in 1884. Carpenters' and joiners' wages have in like manner risen from 9s. to 11s. to from 10s. to 12s. The wages of painters are from 10s. to 12s., as against 9s. to 10s. in previous years. This increase in the current rate of wages is a result of the extensive building operations going on in all parts of the colony, but more especially in Sydney and its suburbs. It should be mentioned that, except where heavy masses of stone have to be raised, exterior scaffoldings are seldom used; also that bricks, mortar, and other heavy materials, are often raised by steam power to the height required, manual labour being less used for this purpose than in England.

Crown-street Warehouses, Soho.—Now that the eastern side of Crown-street is in course of demolition by the Metropolitan Board of Works for the new street from Tottenham Court-road to Charing-cross, Messrs. Crosse & Blackwell's warehouses, which had to be kept down owing to the narrowness of the street, and threats of proceedings for light and air, have just been completed. They are of red brick, with Pether's patent ornamental brick panels under the windows, with Portland stone cornices, strings, window-heads, &c. The columns of the windows, except on the top floor and tower, are of cast iron. The principal feature of the warehouse is the circular tower at the northern angle, which is a little higher than the remaining part of the building, and has a high roof, covered with purple and green slates a little more than halfway up, the remainder being lead. A spiral stone string runs up the tower, with two light circular-headed windows lighting the staircase, and following the curve of the string-course. The ground-floor is fireproof, being constructed of brick arches on cast-iron "springers" or "skew-backs, covered with Wilkinson's patent cement flooring. The premises were originally carried out by Messrs. Macey & Sons, who have just completed the remaining unfinished portions, under the direction of Messrs. Roumieu & Aitchison, from drawings by the late Mr. R. L. Roumieu.

The Decay of the American Obelisk.—As was the case with our own Cleopatra's Needle on the Thames Embankment, before a preventive composition was applied, the corresponding Egyptian obelisk, placed in Central Park, New York, is found to be rapidly crumbling away under the influence of the climate. For 4,000 years the needle suffered comparatively little change in the dry, warm air of Egypt; but although it has been in America only five years, there are unmistakeable signs of its serious decay. Fragments of stone are found scattered at the base of the needle, and flakes, 1 in. or more in length, can readily be picked off with the fingers. On the eastern side of the monolith there is a fissure 3 ft. in length, and sufficiently wide to admit the insertion of a knife-blade for a distance of 2 in. or 3 in. A finer crevice extends to a much greater depth. The vein containing the fissure can be traced to the south and west sides. Should this large fragment split off, the obelisk would undoubtedly fall. These indications have led the Park Board to consider means for its artificial preservation.—*Iron.*

Tanworth Church, Birmingham.—This church, which has hitherto been lighted by means of single-wick lamps, has just been furnished with polished brass coronæ and brackets, by Messrs. Jones & Willis, the burner used being their patent "Hesperus."

Truro New Post-office Buildings.—The plans for this building, which have gone through many vicissitudes in preparation, have been finally sanctioned by the Office of Works and the Treasury on behalf of the Post Office. The new premises will be Classic in style; the ground-floor to the first cornice will be built in granite, above this in Plymouth limestone, relieved with Bath stone quoins, mouldings, cornices, pilasters, and cappings. Internally, the new building, with its three floors, will possess ample space and every convenience for carrying on the postal business of the City. On the ground-floor, entered through a tiled vestibule and inner folding-doors, will be the public office, 27 ft. by 21 ft. The different floors will be connected by lifts, pneumatic tubes, and speaking-tubes, and adequate provision will be made for heating and ventilation in each room. Throughout, the Office of Works have examined and approved every detail, and carefully provided for the personal comfort of the *employés*, of which there is provision for both sexes. The buildings are expected to be ready for occupation by Michaelmas. The architect is Mr. Trevail.

Sheffield School of Art. — The annual meeting of the Sheffield School of Art was held last week, Mr. John Fowler in the chair. The council, in their report, expressed deep regret in recording the death of the two oldest members of the council, namely, Mr. M. E. Hadfield, who died on the 9th of March last, and Ald. Robert Leader, J.P., both of whom devoted much valuable time and rendered important services to the school. In accordance with rule 8, Messrs. J. Y. Cowlishaw, Charles Hadfield, and J. B. Mitchell-Withers retired from the council by rotation, and had all been re-elected, and Mr. Charles Belk (the Master Cutler) had been elected in the place of the late Mr. M. E. Hadfield. Mr. J. T. Cook, the head master, reported that the attendance during the year ending July 31, 1885, had been:—Morning class, 93; male evening class, 223; ladies' evening class, 65; Attercliffe branch evening class, 15; Lowfield branch evening class, 23; total number of students, 419. The department awards for the year are:—Two silver medals, four bronze medals, seven national book prizes for works, and three for examinations, making sixteen awards. The reports of the council and the head master, and the abstracts of the treasurer's accounts, were approved and adopted.

Examination of Local Surveyors and Inspectors of Nuisances.—At an examination held November 12th and 13th, by the Sanitary Institute of Great Britain, thirty-nine candidates presented themselves, eleven as Local Surveyors, and twenty-eight as Inspectors of Nuisances. Questions were set, to be answered in writing on the 12th, and the candidates were examined *viva voce* on the 13th. The Institute's certificate of competency to discharge the duties of Local Surveyors was awarded to R. E. W. Berrington, W. Santo Crimp, A.M.I.C.E.; and to discharge the duties of Inspectors of Nuisances to W. J. Bartlett, W. J. Bugler, T. G. Dee, S. O. Dimond, S. Dyer, D. Emptage, P. Gaskell, A. A. Goodwyn, A. A. Grist, J. T. Hazell, D. H. Jones, W. M. Lowick, J. E. Morris, G. Reavell, jun., N. Simmons, A. W. Stanley, F. P. Trepess, B. Sweston, T. W. Witts.

The Proposed Mansion House Subway. On Tuesday last, at a meeting of the City Commission of Sewers, the Streets Committee brought up a report on the proposed construction of a subway at the Mansion House. They submitted an opinion by the Attorney-General and Mr. J. Henderson that the commission had no power to make subways in the manner suggested, or in any similar manner, and they could not apply the rates to a purpose which was unauthorised. The only way in which the proposed improvement could be legally constructed would be by getting statutory powers for the purpose. Mr. Altman moved that in order to save time Parliamentary notice be given of a Bill empowering the commissioners to construct the subways, should they so decide. Mr. Shaw, as an amendment, proposed that a report from the engineer on the subject be printed and considered before the commission committed itself to promoting a Bill in Parliament to amend the Sewers Act. The amendment was carried, and, as it is understood that Saturday is the last day on which Parliamentary notice can be given for next Session, the matter is shelved for a year. —*Morning Post.*

A Refuse-Destructor for Whitechapel. Last week Mr. Robert Gladding, Chairman of the Whitechapel District Board of Works, laid the foundation-stone of the shaft of the Destructor now being erected in Wentworth-street, for the purpose of dealing with the local refuse. Among others in attendance were Colonel Munro (Metropolitan Board of Works), Mr. Little (builder of the works), Mr. Wolsey (superintendent of the works), Mr. Charles Thompson (foreman of the bricklayers), Mr. W. Warner (representative of the engineers and patentees of the method, Messrs. Manlove, Alliott, Fryer, & Co., of Nottingham), Mr. Turner (Clerk of the Board), Mr. La Riviere (surveyor), and many others interested in the treatment of refuse. At the opening of the proceedings, Mr. La Riviere, the surveyor, explained that the shaft had been calculated with every care and thought, and the works were having applied to them all the various improvements of construction which have been obtained by the experience of the engineers in those destructors they had already erected. He had, therefore, every confidence that the object for which the works are being constructed would be most successfully attained. The stone having been duly lowered with the customary formalities, was declared to be well and truly laid. Standing upon the foundation, Mr. Gladding proceeded to explain the causes which had induced the District Board to take the important step of erecting a destructor. He claimed the occasion as one marking distinct municipal progress,—a step not taken without long and patient inquiry on the part of the Board, most zealously and ably assisted by their two chief officers, Mr. A. Turner and Mr. La Riviere. By the destructor, it was hoped and believed that an efficient means would be afforded of getting rid of all the abnoxious refuse and waste material in the district in such a way as to injure no one, while conferring a great benefit on all.

Manchester Architectural Association. This Society inaugurated its eleventh session by a *soirée*, given on the Tuesday of last week, when the meeting was addressed by Mr. Lawrence Booth, the President, and by the Bishop of Salford, who was present as a guest. Mr. Adamson, Mr. Murgatroyd, and Mr. France (President of the Bradford Society of Architects), also addressed the meeting. The President of the Association will deliver his inaugural address on the 24th.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	12 10 0	15 10 0
Sequoia, U.S. ....ft. cube	0 2 6	0 2 9
Ash, Canada ....load	3 0 0	5 0 0
Birch ,, ...	3 0 0	4 10 0
Elm ,, ...	3 10 0	5 0 0
Fir, Dantsic, &c.	1 13 0	4 10 0
Oak ,, ...	3 0 0	5 0 0
Canada	6 0 0	7 0 0
Pine ,, red	3 0 0	4 0 0
,, yellow	3 15 0	5 5 0

TIMBER (*continued*).	£. s. d.	£. s. d.
Lath, Dantsic ....fathom	5 0 0	6 0 0
St. Petersburg	5 0 0	7 0 0
Wainscot, Riga....log	2 15 0	4 10 0
Deals, Finland, 2nd and 1st...std. 100	8 0 0	9 0 0
,, 4th and 3rd	6 10 0	7 10 0
Riga	6 0 0	8 0 0
St. Petersburg, 1st yel.	9 0 0	15 0 0
,, 2nd ,, ...	7 0 0	8 15 0
,, white	8 0 0	10 10 0
Swedish....	6 0 0	16 0 0
White Sea	8 0 0	19 0 0
Canada, Pine 1st	18 0 0	32 10 0
,, 2nd	12 0 0	18 10 0
,, 3rd, &c.	7 0 0	10 10 0
,, Spruce 1st	9 0 0	12 0 0
,, 3rd and 2nd	6 10 0	8 0 0
New Brunswick, &c....	5 0 0	7 10 0
Battens, all kinds	4 0 0	13 0 0
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 3	0 0 3½
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo cargo av.	0 0 5½	0 0 7½
Mexican ,, ...	0 0 4	0 0 5
Tobasco cargo av.	0 0 4	0 0 6½
Honduras cargo av.	0 0 4½	0 0 6½
Rose, Rio ....ton	7 0 0	16 0 0
Bahia....	6 0 0	14 0 0
Satin, St. Domingo .... ft.	0 0 0	0 0 0
Porto Rico	0 0 0	0 0 0
Walnut, Italian	0 0 4	0 0 5

METALS.		
IRON—Pig in Scotland ....ton	2 2 6	0 0 0
Bar, Welsh, in London....	4 15 0	5 2 6
,, in Wales	4 7 6	4 12 6
,, Staffordshire, London	6 0 0	7 0 0
Sheets, single, in London....	7 10 0	9 0 0
Hoops ,, ...	6 5 0	7 5 0
Nail-rods ,, ...	6 7 6	7 0 0
COPPER—		
British, cke. and ingt. ....ton	43 10 0	44 10 0
Best selected	44 10 0	46 0 0
Sheets, strong....	52 0 0	0 0 0
,, India	48 0 0	48 10 0
Australian, fine cash....	0 0 0	0 0 0
Chili, bars ,, ...	40 17 6	41 5 0
YELLOW METAL....lb.	0 0 4½	0 0 4¾
LEAD—Pig, Spanish	11 7 6	0 0 0
English, com. brands	11 12 6	0 0 0
SPELTER—		
Silesian, special ....ton	14 5 0	14 10 0
Ordinary brands	14 0 0	14 5 0
TIN—		
Straits	90 5 0	91 15 0
Australian	91 7 6	92 0 0
English ingots....	94 0 0	0 0 0
TINPLATES—		
IC coke ....box	15 0 0	16 0 0
IX ditto	21 0 0	25 0 0
IC charcoal	17 6 0	20 0 0
IX ditto	24 0 0	26 0 0

OILS.		
Linseed ....ton	22 0 0	22 10 0
Cocoanut, Cochin	30 10 0	31 0 0
Ceylon	27 10 0	0 0 0
Copra....	26 10 0	0 0 0
Palm, Lagos	29 0 0	0 0 0
Palm-nut Kernel	26 0 0	0 0 0
Rapeseed, English pale....	24 10 0	0 0 0
,, brown	22 15 0	0 0 0
Cottonseed, refined	19 10 0	20 0 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	7 0 0	10 0 0
,, Refined	4 0 0	15 0 0
TURPENTINE—		
American, in cks. ....cwt.	1 7 0	1 7 3
TAR—Stockholm ....brl.	0 19 6	1 0 0
Archangel....	0 11 6	0 12 0

CONTRACTS AND PUBLIC APPOINTMENTS.

Epitome of Advertisements in this Number.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up Roads	Wandsworth Bd. of Wks	*Official*	Nov. 24th	ii.
Roadmaking and Paving	Fulham Board of Wks.	do.	Nov. 25th	ii.
Repairs to Infirmary	St. Saviour's Union....	Jarvis & Son	Nov. 26th	ii.
Enlargement of Postal Sorting-Office	Com. of H.M. Works ...	*Official*	Nov. 27th	ii.
Roadmaking, Excavating, &c., Northn Hospitl	Met. Asylums Board ...	Pennington & Bridgen	do.	ii.
Laying-out and Planting Grounds do.	do.	do.	do.	ii.
Drainage and Sanitary Works, Ashford....	Mangrs. W. L Sch. Dist.	Keith D. Young	do.	ii.
York Paving	Gravesend Corporation	*Official*	do.	ii.
Broken Guernsey Granite	Finchley Local Board...	G. W. Brumell....	Nov. 28th	ii.
Pipe Sewers, &c.	Romford U. R. S. A. ...	Brundell, Simmons, & Co	Nov. 30th	ii.
Surface Drains, &c.	Tottenham Local Board	— De Pape	Dec. 1st	ii.
Wood-Paving	Westminstr Bd. of Wks.	G. R. W. Wheeler	Dec. 2nd	ii.
Brick Sewers	Borough of Leicester...	*Official*	Dec. 3rd	xiii.
Iron Pier, Lee-on-the-Solent	....	E. A. Robinson....	Dec. 5th	ii.
Sea Waterworks	Gt. Yarmouth U. S. A.	J. W. Cockrill	Dec. 8th	xiii.
Gasholder Tanks, &c., Bridgend	Glamorgan Co. Lunatic Asylum	Giles & Gough	do.	ii.
Strengthening, &c., Albert Suspension Bridge	Met. Board of Works	*Official*	Dec. 17th	ii.
Slaughter-House, &c., Moscow	The Commsnrs, Moscow	....	Dec. 27th	ii.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.	Page.
Surveyor and Inspector of Nuisances	City of Chichester	120*l.*	Nov. 28th	xvi.

TENDERS.

CAMBRIDGE.—For erecting Cambridge University Laboratory. Mr. J. J Stevenson, architect. Quantities by Mr. J. Gandy:—

Lawrance & Sons, London	£22,900	0	0
Henry Lovatt, Wolverhampton	22,405	0	0
Holland & Hannen, London	22,377	0	0
George Dobson, Colchester	20,480	0	0
L. Loveday, Leicestershire	19,950	0	0
J. Parnell & Son, Rugby	19,777	0	0
Wm. Sindall, Cambridge	19,590	0	0
John Bentley, Waltham Abbey	19,354	0	0
P. Horsman & Co., Wolverhampton	19,300	0	0
Bull, Sons, & Co., Southampton	19,300	0	0

CHARLTON.—For alterations and additions to the entrance lodge and new gates and piers, Charlton Cemetery. Mr. John Rowland, architect and surveyor, Old Charlton. No quantities:—

	Gates and piers.	Alterations & additions.
Stephens	£45 0 0	£280
Barham	53 0 0	275
Grant	41 10 0	271
Cattell	36 0 0	269
Proctor	51 0 0	268
William & Sons	46 17 0	235
Stacey*	32 0 0	235
Lonergan	58 0 0	220
Johnson	38 10 0	218
Smith	34 19 0	212
Fenn	—	205
Reeves	50 0 0	185
Congdon†	41 12 0	179

[Surveyor's estimate, 50*l.* and 181*l.* 17s.]
* Accepted for gates.
† Accepted for alterations, &c.

GRAYS.—For additions and alterations to the King's Arms public-house, Grays, Essex, for Messrs. Ind Coope & Co. Mr. John Hudson, architect, Leman-street:—

Bentley, Waltham Abbey	£1,500 0 0
J. & H. Cocks, Mile End	1,068 0 0
J. S. Hammond & Son,* Romford	998 0 0

* Accepted.

LAMBETH.—For tiling walls of kitchen and other works at the Workhouse, Renfrew-road, for the Guardians:—

Brown, Norwood	£210 0 0
C. Mansfield, Stratford	190 0 0
W. Nash, Kensington	170 0 0
Roberts	167 0 0
Seed	165 0 0
Swan & Barlow	158 0 0
Cox & Hamilton	146 0 0
Blanden (accepted)	145 0 0

LONDON.—For sinking wells at the Ladywell and Forest Hill Public Baths. Messrs. Wilson, Son, and Aldwinckle, architects, East India-avenue:—

	Well at Ladywell Bath.	Well at Forest Hill Bath.
Tilley & Son	£1,085	£2,025
Speller	1,225	1,225
Docwra	705	1,335
Baker & Sons	666	1,265

LONDON.—For sanitary works at Berkeley House, for the Baron de Barreto. Mr. J. Kingwell Cole, architect, Mount-street, W. Messrs. Battam & Co., surveyors:—

J. Hodd, Edgware-road	£122 0 0
Wall Bros., Kentish Town	97 0 0

NEWMARKET.—For stabling and additions to Grafton House, Newmarket, Cambs., for Baron L. le Hirsch. Mr. J. B. Corby, architect and surveyor, Stamford:—

Law & King, Lutterworth	£1,820 0 0
Farrow, Wisbech	2,497 0 0
Thoday & Son, Cambridge (accepted)	2,393 0 0

OXTED (Surrey).—For the erection of a store at Oxted, for Messrs. Young & Berry. Mr. A. R. Stenning, architect, Cannon-street. Quantities by Mr. W. B. Brown, Henrietta-street, Covent Garden:—

Loveland	£830 0 0
Lawrence & Sons	821 0 0
Roberts	813 0 0
Crossley	808 0 0
Worsell	779 0 0
Nightingale	766 0 0
Chafin	740 0 0
Marsland, Chislehurst (accepted)	698 0 0

SOMERSHAM (Hunts).—For the erection of five loose boxes at Pedley House Farm, for Messrs. Foster. Mr. J. Carter Jonas, surveyor, Cambridge:—

Hicks	£125 0 0
Worboys	120 0 0
Saint & Sons (accepted)	102 0 0

STRATFORD.—For new show-rooms at rear of Broadway, for Mr. J. R. Roberts. Mr. J. Kingwell Cole, architect, Mount-street, W. Messrs. Battam & Co., surveyors:—

Wall Bros., Kentish Town	£549 0 0
Palmer & Co., Old Gravel-lane, E.	525 0 0

WESTGATE-ON-SEA.—For the erection of two shops and premises at Westgate-on-Sea, Thanet (exclusive of plumbing and decorating work, stoves, and chimney-pieces), for Mr. R. T. Jarman. Mr. A. Gordon Collins, architect, Westgate-on-Sea:—

Paramor & Son, Margate	£2,250 0 0
W. Frostick, Westgate	1,890 0 0
W. Martin, Ramsgate	1,520 0 0
H. Bowman, Ramsgate (accepted)	1,265 0 0

Staines.—The list of tenders for villa given last week was, we are informed, incomplete; the two following should be added to it:—Hiscock, 625*l.*; Cargeaven, 597*l.*

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

TO CORRESPONDENTS.

Registered Telegraphic Address, "THE BUILDER, LONDON."

T. B. (thanks for your appreciative letter).—R. C. J.—J. C. R.—G. J.—T. C.—W. C. W.—J. E. W.—T. G. S.—G. B., Washington (M.S. received).—P. (we have already given our opinion on the subject).

All statements of facts, lists of tenders, &c., must be accompanied by the name and address of the sender, not necessarily for publication.

We are compelled to decline pointing out books and giving addresses.

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150,000 feet cube,
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Asphalte.
Seyssel, Patent Metallic Lava, and White Asphaltes.
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